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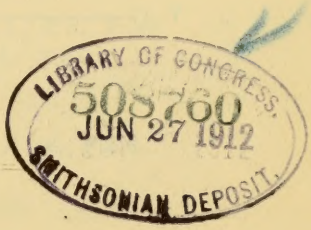

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List of Fellows

OF THE

ENTOMOLOGICAL SOCIETY OF LONDON.

HONORARY FELLOWS.

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1898 Weismann, Dr. August, *Freiburg, Baden.*

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1911 Edwards, F. W., *Kingswear, Cornwall-road, Harrow.*

1886 Edwards, James, *Colesborne, Cheltenham.*

1884 Edwards, Stanley, F.L.S., F.Z.S., 15, *St. Germans-place, Blackheath*, S.E.
1900 Elliott, E. A., 16, *Belsize Grove, Hampstead*, N.W.
1900 Ellis, H. Willoughby, *Holly Hill, Berkswell, Warwickshire.*
1886 Ellis, John W., M.B., L.R.C.P., 18, *Rodney-street, Liverpool.*
1903 Eltringham, Harry, M.A., F.Z.S., *Eastgarth, Westoe, South Shields*, and *Hope Department, University Museum, Oxford.*
1878 Elwes, Henry John, J.P., F.R.S., F.L.S., F.Z.S., (Pres., 1893–4; V.-Pres., 1889–90, 1892, 1895; Council, 1888–90), *Colesborne, Cheltenham.*
1886 Enock, Frederick, F.L.S., 13, *Tufnell Park Road, London*, N.
1903 Etheridge, Robert, *Curator, Australian Museum, Sydney, N.S.W.*
1908 Eustace, Eustace Mallabone, B.A., *Challacombe Rectory, Parracombe, R.S.O., N. Devon*, and *Wellington College, Berks.*
1909 Evans, Frank J., *The Botanical Department, Trinidad, B.W.I.*

1899 Farmborough, Percy W., *Lower Edmonton, Middlesex.*
1907 Feather, Walter, *Voi, British East Africa.*
1900 Feltham, H. L. L., *P. O. Box* 46, *Johannesburg, Transvaal.*
1861 Fenn, Charles, *Eversden House, Burnt Ash Hill, Lee*, S.E.
1886 Fenwick, Nicolas Percival, *The Gables, New-road, Esher.*
1908 Fenwick, Norman Percival, Junior, *The Gables, New-road, Esher.*
1910 Fenyes, A., M.D., 61, *East Colorado-street, Pasadena, California, U.S.A.*
1889 Fernald, Prof. C. H., *Amherst, Mass., U.S.A.*
1900 Firth, J. Digby, F.L.S., *Boys' Modern School, Leeds.*
1874 Fitch, Edward A., F.L.S., (Sec., 1881–5; Council, 1879, 1886), *Brick House, Maldon, Essex.*
1905 Fleet, Wilfred James, *Imatra, King's Road, Bournemouth.*
1900 Flemyng, The Rev. W. Westropp, M.A., *Coolfin, Portlaw, Co. Waterford.*
1898 Fletcher, T. Bainbrigge, R.N., *Agricultural Research Institute, Pusa, Bengal, India.*
1883 † Fletcher, William Holland B., M.A., *Aldwick Manor, Bognor.*
1905 Floersheim, Cecil, 16, *Kensington Court Mansions*, S.W.
1885 Fokker, A. J. F., *Zierikzee, Zeeland, Netherlands.*
1900 Foulkes, P. Hedworth, B.Sc., *Harper-Adams Agricultural College, Newport, Salop.*
1898 Fountaine, Miss Margaret, 1, *The Studios, Sheriff-road, West Hampstead*, N.W.
1880 Fowler, The Rev. Canon, D.Sc., M.A., F.L.S., (Pres., 1901–2; V.-Pres., 1903; Sec., 1886–96), *Earley Vicarage, near Reading.*
1908 Fraser, Frederick C., Capt., M.D., I.M.S., Assist. Superint., *Govt. Maternity Hospital, Madras, India.*
1896 Freke, Percy Evans, *Southpoint, Limes-road, Folkestone.*
1888 Fremlin, H. Stuart, M.R.C.S., L.R.C.P., *St. Stephens, St. Albans.*

1903 French, Charles, F.L.S., Government Entomologist, *Melbourne, Victoria, Australia.*
1910 Frisby, G. E., 40, *Windmill-street, Gravesend.*
1908 Froggatt, Walter W., F.L.S., *Government Entomologist*, 138, *George-street, Sydney, New South Wales.*
1891 Frohawk, F. W., *Ashmount, Rayleigh, Essex.*
1906 † Fry, Harold Armstrong, *P.O. Box* 46, *Johannesburg, Transvaal Colony.*
1900 Fryer, H. Fortescue, *The Priory, Chatteris, Cambs.*
1907 Fryer, John Claud Fortescue, *The Priory, Chatteris, Cambs.*
1876 Fuller, The Rev. Alfred, M.A., *The Lodge*, 7, *Sydenham-hill, Sydenham*, S.E.
1898 Fuller, Claude, Government Entomologist, *Pietermaritzburg, Natal.*

1887 Gahan, Charles Joseph, M.A., (Sec., 1899–1900; Council, 1893-5, 1901), 8, *Lonsdale-road, Bedford Park*, W.; and *British Museum* (*Natural History*), *Cromwell-road*, S.W.
1910 Garcke, Emile, M.I.E.E., *Witton House, Maidenhead.*
1892 Garde, Philip de la, R.N., 8, *Queen's-terrace, Exeter.*
1890 Gardner, John, *Laurel Lodge, Hart, West Hartlepool.*
1901 † Gardner, Willoughby, F.L.S., *Deganwy, N. Wales.*
1910 Geary, T. H., *Enderby, Leicestershire.*
1899 Geldart, William Martin, M.A., 27, *Beaumont-street, Oxford.*
1906 † Gibbs, Arthur Ernest, F.L.S., F.R.H.S., *Kitchener's Meads, St. Albans.*
1908 Giffard, Walter M., *P.O. Box* 308, *Honolulu, Hawaii.*
1907 Giles, Henry Murray, Head Keeper of Zoological Gardens, *Perth, W. Australia.*
1902 Gillanders, A. T., *Park Cottage, Alnwick.*
1904 Gilliat, Francis, B.A., c/o Rev. G. Gilliat, *Haselbury Vicarage, Crewkerne, Somerset.*
1865 † Godman, Frederick Du Cane, D.C.L., F.R.S., F.L.S., F.Z.S., Pres., 1891–2; V.-Pres., 1882–3, 1886, 1889–90, 1902; Council, 1880–1, 1900), *South Lodge, Lower Beeding, Horsham*; and 45, *Pont-street*, S.W.
1886 † Goodrich, Captain Arthur Mainwaring, *Bridlington House, near Bristol.*
1904 Goodwin, Edward, *Canon Court, Wateringbury, Kent.*
1898 Gordon, J. G. McH., *Corsemalzie, Whauphill, R.S.O., Wigtownshire.*
1898 Gordon, R. S. G. McH., *Corsemalzie, Whauphill, R.S.O., Wigtownshire.*
1855 Gorham, The Rev. Henry Stephen, F.Z.S., (Council, 1882–3), *Highcroft, Great Malvern.*
1910 Gottmann, A. M. S., 94, *Niddastrasse, Frankfurt-am-Main, Germany.*
1909 Gowdey, Carlton C., B.Sc., c/o Dr. A. Gowdey, 209, *Camden-road, N.W.*
1911 Graves, P. P., *Club de Constantinople, Constantinople, Turkey.*
1891 † Green, E. Ernest, Government Entomologist, *Royal Botanic Gardens, Peradeniya, Ceylon*; and *Mote Hall, Bearsted, Kent.*

1910 Green, Herbert A., *The Central Fire Station, Durban, Natal.*
1894 Green, J. F., F.Z.S., *West Lodge, Blackheath,* S.E.
1898 Greenshields, Alexander, 38, *Blenheim-gardens, Cricklewood,* N.W.
1893 † Greenwood, Henry Powys, F.L.S., *Whitsbury House, Salisbury.*
1888 Griffiths, G. C., F.Z.S., *Penhurst,* 3, *Leigh-road, Clifton, Bristol.*
1894 Grimshaw, Percy H., *Royal Scottish Museum, Edinburgh.*
1905 Grist, Charles J., *Elgin House, Knockholt, Sevenoaks.*
1909 Grosvenor, G. H., M.A., *Blakedown, nr. Kidderminster.*
1906 Gurney, Gerard H., *Keswick Hall, Norwich.*
1910 Gurney, William B., Asst. Govt. Entomologist, *Department of Agriculture, Sydney, Australia.*

1906 Hall, Arthur, 7, *Park-lane-mansions, Croydon.*
1890 † Hall, Albert Ernest, *Cranfield House, Southwell, Notts.*
1885 Hall, Thomas William, *Stanhope, The Crescent, Croydon.*
1898 Hamlyn-Harris, R., D.Sc., F.Z.S., F.R.M.S., Director of the Queensland Museum, *Brisbane, Australia.*
1891 Hampson, Sir George Francis, Bart., B.A., F.Z.S., (V.-Pres., 1898 ; Council, 1896–8), 62, *Stanhope-gardens,* S.W.
1891 Hanbury, Frederick J., F.L.S., *Brockhurst, E. Grinstead.*
1905 † Hancock, Joseph L., 5466, *Lexington Avenue, Chicago, U.S.A.*
1903 Hare, E. J., *Dunham, Boscombe, Hants.*
1904 Harris, Edward, *St. Conan's, Chingford, Essex.*
1897 * Harrison, Albert, F.L.S., F.C.S., *Delamere, Grove-road, South Woodford, Essex.*
1910 Harwood, Philip, 23, *Northgate End, Bishop's Stortford.*
1910 Hawkshaw, J. C., *Hollycombe, Sussex.*
1910 Hedges, Alfred van der, 42, *Kensington Park Gardens,* W.
1910 Henderson, J., *Clifton, Ashbourne, Derby.*
1898 Heron, Francis A., B.A., *Abbeyfield, Harpenden.*
1903 Herrod, William, *W.B.C. Apiary, Old Bedford-road, Luton, Beds.*
1908 Hewitt, C. Gordon, D.Sc., *Central Experimental Farm, Dept. of Agriculture, Ottawa, Canada.*
1876 † Hillman, Thomas Stanton, *Eastgate-street, Lewes.*
1907 Hoar, Thomas Frank Partridge, *Mercia, Albany-road, Leighton-Buzzard.*
1888 Hodson, The Rev. J. H., B.A., B.D., *Rhyddington, Clifton Drive, Lytham.*
1902 Hole, R. S., c/o Messrs. King and Co., *Bombay.*
1910 Holford, H. Oliver, *Elstead Lodge, Godalming, Surrey.*
1887 Holland, The Rev. W. J., D.D., Ph.D., *5th Avenue, Pittsburg, Penn., U.S.A.*
1898 Holman-Hunt, C. B., Asst. Entomologist, Department of Agriculture, *Kuala Lumpur, Federated Malay States.*
1910 Holmes, Edward Morrell, *Ruthven, Sevenoaks.*

1901 Hopson, Montagu F., L.D.S., R.C.S.Eng., F.L.S., 30, *Thurlow-road, Rosslyn Hill*, N.W.
1897 Horne, Arthur, 60, *Gladstone-place, Aberdeen.*
1903 Houghton, J. T., 1, *Portland-place, Worksop.*
1907 † Howard, C. W., *Entomologist Department of Agriculture, Box* 255, *Lourenço Marques, Portuguese East Africa.*
1900 Howes, George W., 812, *George-street, Dunedin, New Zealand.*
1907 Howlett, Frank M., M.A., *Wymondham, Norfolk.*
1865 † Hudd, A. E., 108, *Pembroke-road, Clifton, Bristol.*
1888 Hudson, George Vernon, *Hill View, Karori, Wellington, New Zealand.*
1907 Hughes, C. N., 3, *Wyndham Place, Bryanston-square*, W.

1897 Image, Prof. Selwyn, M.A., (Council, 1909–), 20, *Fitzroy-street, Fitzroy-square*, W.
1908 Irby, Captain Leonard Paul, *Brook House. Eastry, S.O., Kent.*
1891 Isabell, The Rev. John, *Sunnycroft, St. Senara, R.S.O., Cornwall.*

1907 Jack, Rupert Wellstood, Government Entomologist, Department of Agriculture, *Salisbury, Rhodesia.*
1907 Jackson, P. H., 112, *Balham-park-road*, S.W.
1907 Jacobi, Professor A., Ph.D., Director of the R. Zoological and Anthrop.-Ethnographical Museum, *Dresden, Saxony.*
1911 Jacobs, Capt. J. J., R.E., 2, *Southport-street, Gibraltar.*
1910 Jacobs, Lionel L., *P. O. Box* 445, *Sault Ste. Marie, Ontario, Canada.*
1869 Janson, Oliver E., *Cestria, Claremont-road, Highgate*, N.; and 44, *Great Russell-street, Bloomsbury*, W.C.
1898 Janson, Oliver J., *Cestria, Claremont-road, Highgate*, N.
1886 Jenner, James Herbert Augustus, *East Gate House, Lewes.*
1899 Jennings, F. B., 152, *Silver-street, Upper Edmonton*, N.
1909 Jepson, Frank P., *Department of Agriculture, Suva, Fiji Islands.*
1886 John, Evan, *Llantrisant, R.S.O., Glamorganshire.*
1907 Johnson, Charles Fielding, *Mayfield. Brinington Crescent, Stockport.*
1889 Johnson, The Rev. W. F., M.A., *Acton Rectory, Poyntz Pass, Co. Armagh.*
1908 Joicey, James J., *The Homestead, Abbot's Brook, Bourne End, Bucks.*
1888 Jones, Albert H., (Council, 1898-1900; Treasurer, 1904–), *Shrublands, Eltham, Kent.*
1910 Jones, Ernest P., 7, *Sherwin-street, Nantwich-road, Crewe.*
1894 † Jordan, Dr. K., (V.-Pres., 1909; Council, 1909–), *The Museum, Tring.*
1910 Joseph, E. G., 23, *Clanricarde-gardens*, W.
1910 Joy, Ernest Cooper, *Eversley, Dale-road, Purley.*
1902 Joy, Norman H., M.R.C.S., L.R.C.P., *Bradfield, Reading.*

1884 Kane, W. F. de Vismes, M.A., M.R.I.A., *Drumleaske House, Monaghan.*

1884 Kappel, A. W., F.L.S., *Linnean Society, Burlington House*, W.
1876 † Kay, John Dunning, *Leeds.*
1896 † Kaye, William James, (Council, 1906–8), *Caracas, Ditton Hill, Surbiton.*
1907 Kelly, Albert Ernest McClure, Assistant Entomologist, Department of Agriculture, *Pietermaritzburg, Natal, S.A.*
1902 Kemp, Stanley W., *The Indian Museum, Calcutta.*
1890 Kenrick, Sir George H., *Whetstone, Somerset-road, Edgbaston, Birmingham.*
1904 Kershaw, G. Bertram, *Ingleside, West Wickham, Kent.*
1906 Keynes, John Neville, M.A., D.Sc., 6, *Harvey-road, Cambridge.*
1900 Keys, James H., *Morwell, Freedom-villas, Lipson-road, Plymouth.*
1911 Khunan, Kunui, M.A., Asst. Entomologist to the Govt. of Mysore, *Bangalore, South India.*
1889 King, J. J. F. X., Lecturer on Economic Entomology at the West of Scotland Agricultural College, 1, *Athole Gardens-terrace, Kelvinside, Glasgow.*
1861 Kirby, William F., F.L.S., (Sec., 1881–5 ; Council, 1886), *Hilden*, 46, *Sutton Court-road, Chiswick*, W.
1889 Klapálek, Professor Franz, *Karlín* 263, *Prague, Bohemia.*
1887 † Klein, Sydney T., F.L.S., F.R.A.S., *Hatherlow, Raglan-road, Reigate.*
1908 Knüdsen, Jens Marius.
1911 Kung, Thien Cheng, Guardian Superintendent of Chinese Students in British India, c/o The Curator, *Mysore Govt. Museum, Bangalore, India.*

1910 Laidlaw, William, *The Cedars, Eastern-road, Romford, Essex.*
1910 Lakin, C. Ernest, M.D., F.R.C.S., 2, *Park-crescent, Portland-place*, W.
1911 † Lamborn, W. A., M.R.C.S., L.R.C.P., *Oni Camp, Lagos, W. Africa.*
1868 Lang, Colonel A. M., C.B., R.E., *Box Grove Lodge, Guildford.*
1901 Lathy, Percy I., *Fox Hall, Enfield.*
1895 Latter, Oswald H., M.A., *Charterhouse, Godalming.*
1908 Lawn, G. W., *Tudor House, Wealdstone, Harrow.*
1899 Lea, Arthur M., Government Entomologist, *Museum, Adelaide, S. Australia.*
1901 Leigh, George F., 45, *Cuthbert's Buildings, West-street, Durban, Natal.*
1910 Leigh, H. S., *The University, Manchester.*
1909 Leigh-Clare, Reginald L., c/o *Messrs. Allen & Gledhill, Solicitors, Singapore.*
1900 Leigh-Phillips, Rev. W. J., *Garfield, Clevedon, Somerset.*
1892 Leslie, J. Henry, 84, *Huron-road, Tooting Common*, S.W.
1898 Lethbridge, Ambrose G., *Guards Club, Pall Mall*, S.W.
1903 † Levett, The Rev. Thomas Prinsep, *Frenchgate, Richmond, Yorks.*
1876 Lewis, George, F.L.S., (Council, 1878, 1884), 87, *Frant-road, Tunbridge Wells.*

1908 † Lewis, John Spedan, *Spedan Towers, Hampstead*, N.W., and 277, *Oxford-street*, W.
1892 Lightfoot, R. M., *Bree-st., Cape Town, Cape of Good Hope.*
1908 Lister, W. K., *Street End House, Ash, near Dover.*
1903 Littler, Frank M., *Box* 114, *P.O., Launceston, Tasmania.*
1865 † Llewelyn, Sir John Talbot Dillwyn, Bart., M.A., F.L.S., *Penllergare, Swansea.*
1881 † Lloyd, Alfred, F.C.S., *The Dome, Bognor.*
1885 † Lloyd, Robert Wylie, (Council, 1900–1), I, 5 and 6, *Albany, Piccadilly*, W.
1903 Lofthouse, Thomas Ashton, *The Croft, Linthorpe, Middlesbrough.*
1908 Longsdon, D., 20, *Holland-park*, W.
1904 † Longstaff, George Blundell, M.D., (V.-Pres., 1909; Council, 1907–9), *Highlands, Putney Heath*, S.W.
1899 Lounsbury, Charles P., B.Sc., Government Entomologist, *Cape Town, S. Africa.*
1894 Lowe, The Rev. Frank E., M.A., *St. Stephen's Vicarage, Guernsey.*
1893 Lower, Oswald B., *St. Oswalds, Bartley Crescent, Wayville, South Australia.*
1901 Lower, Rupert S., *Davenport-terrace, Wayville, South Australia.*
1909 Lucas, Dr. T. P., *Wakefield-buildings, Adelaide-street, Brisbane, Australia.*
1898 Lucas, William John, B.A., (Council, 1904–6), 28, *Knight's Park, Kingston-on-Thames.*
1880 Lupton, Henry, *Courtlands, Chelston, Torquay.*
1903 Lyell, G., Junr., *Gisborne, Victoria, Australia.*
1901 Lyman, Henry H., M.A., F.R.G.S., 74, *McTavish-street, Montreal, Canada.*
1909 Lyon, Francis Hamilton, 89, *Clarence Gate-gardens, Upper Baker-street*, N.W.

1906 McCarrison, D. L., *Indian Police Forces. Madras Club, Madras.*
1887 M'Dougall, James Thomas, *Dunolly, Morden-road, Blackheath*, S.E.
1910 Macdougall, R. Stewart, M.A., D.Sc., F.R.S.E., *Edinburgh University.*
1888 Mackinnon, P. W., *Lyndale, Mussoorie, N.W.P., India.*
1900 Mackwood, The Hon. F. M., M.L.C., *Colombo, Ceylon.*
1911 Maclean, Dr. Ivan Clarkson, M.D., B.Sc., M.R.C.S., L.R.C.P., 28, *Hill-street, Knightsbridge, S.W.*
1899 † Main, Hugh, B.Sc., (Council, 1908–10), *Almondale, Buckingham-road, South Woodford*, N.E.
1911 Mallinson, Rufus, *Oakland, Windermere.*
1905 Mally, Charles Wm., M.Sc., *Graham's Town, Cape Colony.*
1887 Manders, Lieut.-Colonel Neville, R.A.M.C., F.Z.S., c/o Sir C. McGrigor, 25, *Charles-street, St. James's-square*, S.W.
1892 Mansbridge, William, 4, *Norwich-road, Wavertree, Liverpool.*

1894 † Marshall, Alick, *Auchinraith, Bexley, S.O., Kent.*
1895 Marshall, Guy Anstruther Knox, F.Z.S., (Council, 1907–8), 6, *Chester-place, Hyde Park-square,* W.
1896 Marshall, P., M.A., B.Sc., F.G.S., *University School of Mines, Dunedin, New Zealand.*
1856 † Marshall, William, V.M.H., F.R.H.S., *Auchinraith, Bexley, S.O., Kent.*
1897 Martineau, Alfred H., 54, *Holly-lane, W. Smethwick.*
1910 † Mason, C. W., *St. Denis, Shaftesbury, Dorset.*
1895 Massey, Herbert, *Ivy-Lea, Burnage, Didsbury, Manchester.*
1865 Mathew, Gervase F., F.L.S., Paymaster-in-chief, R.N., (Council, 1887), *Lee House, Dovercourt, Harwich.*
1887 Matthews, Coryndon, *Stentaway, Plymstock, S. Devon.*
1900 Maxwell-Lefroy, H., *Imperial College of Science and Technology, South Kensington,* S.W.
1899 May, Harry Haden, *Blackfriars House, Plymouth.*
1904 Meade-Waldo, Geoffrey, *Hever Warren, Edenbridge, Kent,* and *British Museum (Natural History), Cromwell-road,* S.W.
1872 † Meldola, Professor Raphael, F.R.S., F.C.S., (Pres., 1895–6; V.-Pres., 1881, 1884, 1897, 1903, 1908; Sec., 1876–80; Council, 1874–5, 1884–5, 1889–92, 1903, 1907–8), 6, *Brunswick-square,* W.C.
1885 Melvill, James Cosmo, M.A., F.L.S., *Meole Brace Hall, Shrewsbury.*
1887 Merrifield, Frederic (Pres., 1905–6; V.-Pres., 1893, 1907; Sec., 1897–8; Council, 1894, 1899), 14, *Clifton-terrace, Brighton.*
1906 Merriman, Gordon, *The Quick Laboratory, New Museums, Cambridge.*
1905 Merry, Rev. W. Mansell, M.A., *St. Michael's, Oxford.*
1888 Meyer-Darcis, G., 5, *Viale Poggio Imperiale, Florence.*
1880 Meyrick, Edward, B.A., F.R.S., F.Z.S., *Thornhanger, Marlborough.*
1894 Miall, Louis Compton, F.R.S. (Council, 1903, 1908), *Norton Way N., Letchworth.*
1908 Middleton, Ivan E., 11, *High-street, Serampore, Bengal.*
1883 Miles, W. H., *The New Club, Calcutta.*
1910 Millar, F. Grahame, The Tangga Batu Rubber Co., *Malacca, Straits Settlement.*
1906 Mitchell-Hedges, Frederic Albert, 62 & 65 *London Wall, London,* E.C.
1905 Mitford, Robert Sidney, C.B., 35, *Redcliffe-square,* S.W.
1879 Monteiro, Dr. Antonio Augusto de Carvalho, 70, *Rua do Alecrinar, Lisbon.*
1902 Montgomery, Arthur Meadows, 34, *Shalimar Gardens, Pembridge-road, North Acton,* W.
1899 Moore, Harry, 12, *Lower-road, Rotherhithe.*
1907 Moore, Mrs. Catharine Maria, *Holmefield, Oakholme-rd., Sheffield.*
1886 Morgan, A. C. F., F.L.S., 135, *Oakwood-court, Kensington,* W.

1889 † Morice, The Rev. F. D., M.A., Fellow of Queen's College, Oxford, President, (V.-Pres., 1902, 1904 ; Council, 1902–4), *Brunswick, Mount Hermon, Woking.*
1895 † Morley, Claude, *The Hill House, Monk's Soham, Suffolk.*
1910 Morner, Count Birger, Consul for H.M. the King of Sweden, *Sydney, Australia.*
1907 Mortimer, Charles H., *Royton Chase, Byfleet, Surrey.*
1893 Morton, Kenneth J., 13, *Blackford-road, Edinburgh.*
1910 Mosely, Martin E., 21, *Alexandra-court, Queen's-gate,* S.W.
1900 Moser, Julius, 59, *Bulow-strasse, Berlin.*
1882 Mosley, S. L., *The Museum and Technical College, Huddersfield.*
1911 Moss, Rev. A. Miles, *Helm, Windermere.*
1907 Moulton, John C., *The Hall, Bradford-on-Avon, Wilts.*
1911 Mounsey, J. Jackson, 24, *Glencairn-crescent, Edinburgh.*
1901 † Muir, Frederick, *H.S.P.A. Experiment Station, Honolulu, Oahu, H.T.*
1869 † Müller, Albert, F.R.G.S., (Council, 1872–3), c/o Herr A. Muller-Mechel, *Grenzacherstrasse,* 60, *Basle, Switzerland.*
1906 Muschamp, Percy A. H., *Institut, Stäfa,* nr. *Zurich, Switzerland.*
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1903 Neave, S. A., B.A., *Mill Green Park, Ingatestone.*
1901 Nevinson, E. B., *Morland, Cobham, Surrey.*
1907 Newman, Leonard Woods, *Bexley, Kent.*
1909 Newstead, Alfred, *The Grosvenor Museum, Chester.*
1890 Newstead, Robert, M.Sc., A.L.S., Hon. F.R.H.S., Dutton Memorial Professor of Entomology, *The School of Tropical Medicine, University of Liverpool.*
1909 Nicholson, Gilbert W., M.A., M.D., *Cancer Hospital Research Institute, Brompton,* S.W.
1886 Nicholson, William E., *School Hill, Lewes.*
1906 Nix, John Ashburner, *Tilgate, Crawley, Sussex.*
1878 Nottidge, Thomas, *Ashford, Kent.*
1895 Nurse, Lt.-Colonel C. G., *Timworth Hall, Bury St. Edmunds.*
1908 Nurse, H. A., *Botanical Department, Trinidad, B.W.I.*

1877 Oberthür, René, *Rennes (Ille-et-Vilaine), France.*
1893 † Ogle, Bertram S., *Steeple Aston, Oxfordshire.*
1910 Oldaker, Francis A., M.A., *The Red House, Haslemere.*
1873 Olivier, Ernest, *Ramillons, près Moulins (Allier), France.*

1895 Page, Herbert E., *Bertrose, Gellatly-road, St. Catherine's Park,* S.E.
1907 Pead, Clement H., *Box* 252, *Bulawayo, South Africa.*
1911 Pearson, Douglas, *Chilwell House, Chilwell, Notts.*
1883 Péringuey, Dr. Louis, *South African Museum, Cape Town, South Africa.*
1903 † Perkins, R. C. L., M.A., D.Sc., F.Z.S., *Park Hill House, Paignton, Devon,* and Board of Agriculture, Division of Entomology, *Honolulu, Hawaii.*

1879 Perkins, Vincent Robert, *Wotton-under-Edge.*
1907 † Perrins, J. A. D., 3rd Seaforth Highlanders, *Daxenham, Malvern.*
1897 Phillips, Hubert C., M.R.C.S., L.S.A., 262, *Gloucester-terrace, Hyde-park,* W.
1903 † Phillips, Montagu A., F.R.G.S., F.Z.S., 22, *Petherton-road, Highbury New Park,* N.
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1891 Pierce, Frank Nelson, 1, *The Elms, Dingle, Liverpool.*
1903 Pilcher, Colonel Jesse George, I.M.S., F.R.C.S., 133, *Gloucester-road, Kensington,* S.W.
1910 Pillai, A. Raman, *University Union, Edinburgh,* and *Trivandram, India.*
1885 Poll, J. R. H. Neerwort van der, *Driebergen, Netherlands.*
1870 † Porritt, Geo. T., F.L.S., *Elm Lea, Dalton, Huddersfield.*
1884 † Poulton, Professor Edward B., D.Sc., M.A., F.R.S., F.L.S., F.G.S., F.Z.S., Hope Professor of Zoology in the University of Oxford, (Pres., 1903–4 ; V.-Pres., 1894–5, 1902, 1905 ; Council, 1886–8, 1892, 1896, 1905–7), *Wykeham House, Banbury-road, Oxford.*
1905 Powell, Harold, 7, *Rue Mireille, Hyères (Var), France.*
1906 Pratt, H. C., Government Entomologist, Federated Malay States, *Kuala Lumpur, Malay States.*
1908 Pratt, William B., 10, *Lion Gate Gardens, Richmond, Surrey.*
1878 Price, David, 48, *West-street, Horsham.*
1908 Prideaux, Robert M., *Woodlands, Brasted Chart, Sevenoaks.*
1904 Priske, Richard A. R., 9, *Melbourne Avenue, West Ealing.*
1911 Proudfoot, Rev. Samuel, 6, *Lyme-grove, Altrincham, Cheshire.*
1893 Prout, Louis Beethoven, (Council, 1905–7), 62, *Graham-road, Dalston,* N.E.
1910 Punnett, Professor Reginald Crundall, M.A., *Caius College, Cambridge.*

1900 Rainbow, William J., *The Australian Museum, Sydney, N.S.W.*
1907 Rayward, Arthur Leslie, 3, *Albert Mansions, Lansdowne Road, Croydon.*
1893 Reid, Captain Savile G., late R.E., *The Elms, Yalding, Maidstone.*
1898 Relton, R. H., c/o Perkins and Co., Ltd., *Brisbane, Queensland.*
1898 Reuter, Professor Enzio, *Helsingfors, Finland.*
1910 de Rhé-Philipe, G. W. V., c/o Grindlay & Co., *Hastings-street, Calcutta.*
1894 * Riding, William Steer, B.A., M.D., *Stamlands, Buckerell, Honiton.*
1908 Rippon, Claude, M.A., 28, *Walton-street, Oxford.*
1905 Robinson, Herbert C., *Curator of State Museum, Kuala Lumpur, Selangor.*
1904 Robinson, Lady, *Worksop Manor, Notts.*
1892 Robinson, Sydney C., 10, *Inchmory-road, Catford,* S.E.
1869 † Robinson-Douglas, William Douglas, M.A., F.L.S., F.R.G.S., *Orchardton, Castle Douglas.*

1908 Rogers, The Rev. K. St. Aubyn, M.A., *Rabai, Mombasa, British East Africa.*
1909 * Rollason, Wm. Alfred, *Lamorna, Truro, Cornwall.*
1886 Rose, Arthur J., 1, *Harewood-road, S. Croydon.*
1907 Rosenberg, W. F. H., 57, *Haverstock-hill,* N.W.
1868 Rothney, George Alexander James, *Pembury, Tudor-road, Upper Norwood,* S.E.
1894 † Rothschild, The Honble. Nathaniel Charles, M.A., F.L.S., F.Z.S., (Council, 1904), *Arundel-house, Kensington Palace Gardens,* W.
1888 † Rothschild, The Honble. Walter, D.Sc., F.L.S., F.Z.S., (Council, 1900), *Zoological Museum, Tring.*
1890 Routledge, G. B., *Tarn Lodge, Heads Nook, Carlisle.*
1887 Rowland-Brown, Henry, M.A., (V.-Pres., 1908, 1910; Sec., 1900–10), *Oxhey-grove, Harrow Weald.*
1910 Rudge, Miss Carlotta, 1, *Hamilton House, Grove-end-road, St. John's Wood,* N.W.
1910 Rudge, Charles Henry, 1, *Hamilton House, Grove-end road, St. John's Wood,* N.W.
1898 Russell, A., *Wilverley, Dale-road, Purley.*
1892 Russell, S. G. C., 19, *Lombard-street,* E.C.
1899 Ryles, William E., B.A., 14, *Arthur-street, Nottingham.*

1905 St. Quintin, W. H., *Scampton Hall, Rillington, York.*
1906 Sampson, Colonel F. Winn, 20, *Arundel Mansions,* S.W., and *Junior Carlton Club, Pall Mall,* S.W.
1910 Saunders, H. A., *Brookfield-house, Swanage.*
1886 Saunders, Prof. Wm., *Central Experimental Farm, Ottawa, Canada.*
1901 Schaus, W., F.Z.S., 97, *Elm Park Gardens,* S.W.
1907 Schmassman, W., *Beulah Lodge, London-road, Enfield,* N.
1881 Scollick, A. J., 8, *Mayfield-road, Merton Park, Wimbledon.*
1911 Scorer, Alfred George, *Hill Crest, Chilworth, Guildford.*
1909 Scott, Hugh, B.A., *University Museum of Zoology, Cambridge.*
1911 Scott, Percy William Affleck, Chinese Imperial Customs Service, *Hangchow, China.*
1911 Selous, Cuthbert F., M.D., M.R.C.S., L.R.C.P., *Agra, Barton-on-Sea, New Milton, Hants.*
1911 † Sennett, Noel Stanton, 32, *Bolton-gardens, S. Kensington,* S.W.
1862 Sharp, David, M.A., M.B., F.R.S., F.L.S., F.Z.S. (Pres., 1887–8; V.-Pres., 1889, 1891–2, 1896, 1902–3; Sec., 1867; Council, 1893–5, 1902–4), *Lawnside, Brockenhurst, Hants.*
1902 Sharp, W. E., 9, *Queen's-road, South Norwood,* S.E.
1886 Shaw, George T. (Librarian of the Liverpool Free Public Library), *William Brown-street, Liverpool.*
1905 Sheldon, W. George, *Youlgreave, South Croydon.*
1901 † Shelford, Robert, M.A., F.Z.S., (Council, 1907–8), *University Museum (Hope Department), Oxford.*
1900 † Shepheard-Walwyn, H. W., M.A., *Dalachinnie, Kenley, Surrey.*

1887 Sich, Alfred, (Council, 1910–), *Corney House, Chiswick*, W.
1909 * Silverlock, Oscar C., c/o P. M. O. Livingstone, Esq., *N.W. Rhodesia, S. Africa.*
1911 Simes, James A., 2, *The Bryn, Whitehall-road, Woodford, Essex.*
1904 Simmonds, Hubert W., *Sussex View, Tunbridge Wells.*
1902 Sladen, Frederick William Lambart, *The Firs, Ripple, Dover.*
1904 Slipper, The Rev. T. J. R. A., M.A., *Tivetshall Rectory, Norwich.*
1902 Sloper, Gerard Orby, F.Z.S., J.P., *Badminton Club, Piccadilly*, W.
1907 Sly, Harold Baker, *Mapledean, Ringley-avenue, Horley.*
1906 Smallman, Raleigh S., *Homeside, Devonshire Park, Eastbourne.*
1901 Smith, Arthur, *County Museum, Lincoln.*
1911 Smith, B. H., B.A., *Edgehill, Warlingham, Surrey.*
1898 Sopp, Erasmus John Burgess, F.R.Met.S.
1885 South, Richard, (Council, 1890–1), 96, *Drakefield-road, Upper Tooting*, S.W.
1908 Speyer, Edward R., *Ridgehurst, Shenley, Herts.*
1889 Standen, Richard S., F.L.S., (Council, 1906), *Townlands, Lindfield, Sussex.*
1910 Stanley, The Rev. Hubert George, *Marshfield Vicarage, Cardiff.*
1898 Stares, C. L. B., M.R.C.S., L.R.C.P., *The Limes, Swanley Junction, Kent.*
1898 Stebbing, Henry, *Chasewood, Round Oak Wood, Weybridge.*
1910 Stenton, Rupert, *St. Edward's, St. Mary Church, Torquay.*
1910 Stoneham, Hugh Frederick, Lieut. E. Surrey Regt., *Kinsale, Co. Cork.*
1896 Strickland, T. A. Gerald, *Southcott, Poulton, Fairford.*
1900 Studd, E. A. C., *Kerremens, British Columbia.*
1895 Studd, E. F., M.A., B.C.L., *Oxton, Exeter.*
1882 Swanzy, Francis, *The Quarry, Sevenoaks.*
1908 Swierstray, Commr. T., 1st Assistant, *Transvaal Museum, Pretoria.*
1884 Swinhoe, Colonel Charles, M.A., F.L.S., F.Z.S., (V.-Pres., 1894 ; Council, 1891–3 ; 1902–4), 6, *Gunterstone-road, Kensington*, W.
1894 Swinhoe, Ernest, 6, *Gunterstone-road, Kensington*, W.
1876 Swinton, A. H., *Oak Villa, Braishfield, Romsey, Hants.*
1911 Swynnerton, C. F. M., *Mt. Chirinda, Melsetter, S.-E. Rhodesia.*

1910 Tait, Robt., junr., *Roseneath, Harborough-road, Ashton-on-Mersey.*
1908 Talbot, G., 17, *Steeles-road, Haverstock-hill*, N.W.
1911 Tautz, P. H., *Cranleigh, Pinner, Middlesex.*
1893 Taylor, Charles B., *Gap, Lancaster County, Penn., U.S.A.*
1911 Taylor, Frank, *Technological Museum, Sydney, N.S.W.*
1903 Taylor, Thomas Harold, M.A., *Yorkshire College, Leeds.*
1910 * Terry, Frank Wray, *P.O. Box* 411, *Honolulu, Hawaii.*
1909 Tetley, Alfred, M.A., 22, *Avenue-road, Scarborough.*
1910 Theobald, F. V., M.A., *Wye Court, Wye.*
1901 Thompson, Matthew Lawson, 40, *Gosford-street, Middlesbrough.*
1892 Thornley, The Rev. A., M.A., F.L.S., "*Hughenden*," *Coppice-road, Nottingham.*

1907 Tillyard, R. J., B.A., *Kuranda, Mount Errington, Hornsby, New South Wales.*
1911 Todd, R. G., *The Limes, Hadley Green,* N.
1897 Tomlin, J. R. le B., M.A., (Council 1911–), *Stoneley, Alexandra-road, Reading.*
1907 Tonge, Alfred Ernest, *Aincroft, Reigate, Surrey.*
1907 Tragardh, Dr. Ivar, *The University, Upsala, Sweden.*
1859 † Trimen, Roland, M.A., F.R.S., F.L.S., (Pres., 1897–8; V.-Pres., 1896, 1899; Council, 1868, 1881, 1890), *Fawley, Onslow-crescent, Woking.*
1906 Tryhane, George E., *Pedro Miguel Canal Zone, Panama.*
1906 Tulloch, Major James Bruce Gregorie, *The King's Own Yorkshire Light Infantry; Head Quarters, South China Command, Hong Kong.*
1895 Tunaley, Henry, 13, *Begmead-avenue, Streatham,* S.W.
1910 Turati, Conte Emilio, 4, *Piazza S. Alessandro, Milan, Italy.*
1898 Turner, A. J., M.D., *Wickham Terrace, Brisbane, Australia.*
1893 Turner, Henry Jerome, (Council, 1910–), 98, *Drakefell-road, St. Catherine's Park, Hatcham,* S.E.
1906 Turner, Rowland E., (Council, 1909–10), 21, *Emperor's Gate,* S.W.
1894 Turner, Thomas, *Cullompton, Devon.*

1893 Urich, Frederick William, C.M.Z.S., *Port of Spain, Trinidad, British West Indies.*

1904 † Vaughan, W., *Badulla, India.*
1866 * Verrall, George Henry, (Pres., 1899, 1900; V.-Pres., 1892–3, 1902, 1907; Sec., 1873–4; Council, 1891, 1897–8; 1903–4, 1907–8), *Sussex Lodge, Newmarket.*
1909 Vidler, Leopold A., *The Carmelite Stone House, Rye, Sussex.*
1911 Vitalis, R., Commis de 1re classe, *Pnom-Penk, Cambodia, French Indo-China.*

1895 Wacher, Sidney, F.R.C.S., *Dane John, Canterbury.*
1899 Wade, Albert, 12, *Cadogan-place, Preston, Lancashire.*
1897 Wainwright, Colbran J., (Council, 1901), 45, *Handsworth Wood-road, Handsworth, Birmingham.*
1878 Walker, James J., M.A., R.N., F.L.S., (Council, 1894, 1897–8; Secretary, 1905–), *Aorangi, Lonsdale-road, Summertown, Oxford.*
1863 † Wallace, Alfred Russel, O.M., D.C.L. Oxon., F.R.S., F.L.S., F.Z.S., (Pres., 1870–1; V.-Pres., 1864, 1869; Council, 1866, 1872), *Broadstone, Wimborne, Dorset.*
1866 † Walsingham, The Right Honble. Lord, (Pres., 1889–90; V.-Pres., 1882, 1888, 1891–2, 1894–5; Council, 1896), *British Museum (Natural History), Cromwell-road,* S.W.
1910 Ward, John J., *Rusinurbe House, Somerset-road, Coventry.*

1908 Warren, Brisbane C. S., *Innis, Claygate, Surrey.*
1886 Warren, Wm., M.A., *East Croft, Langdon-street, Tring, Herts.*
1869 Waterhouse, Charles O., I.S.O., (Pres., 1907–8 ; V.-Pres., 1900, 1909 ; Council, 1873, 1882–3 ; 1898–1900), *Ingleside, Avenue-gardens, Acton,* W.
1901 † Waterhouse, Gustavus A., B.Sc., F.C.S., *Allonvie, Stanhope-road Killara, New South Wales, Australia.*
1904 Watson, The Rev. N. Beresford, *St. Martin's Vicarage, St. Philip, Barbados, W. Indies.*
1893 Webb, John Cooper, 218, *Upland-road, Dulwich,* S.E.
1908 Wellman, F. Creighton, M.D., *U.S. Museum, Washington, U.S.A.*
1876 † Western, E. Young, 36, *Lancaster Gate, Hyde Park,* W.
1886 Wheeler, Francis D., M.A., LL.D., *Bracondale Cottage, Lower Hellesdon, Norwich.*
1906 Wheeler, The Rev. George, M.A., F.Z.S., (Secretary, 1911–), 37, *Gloucester-place,* W.
1910 White, Edward Barton, M.R.C.S., *Cardiff City Mental Hospital, Cardiff.*
1907 White, Harold J., 42, *Nevern-square, Kensington,* S.W.
1911 Whitehouse, H. Beckwith, M.S., F.R.C.S., 52, *Newhall-street, Birmingham.*
1911 Whittingham, Rev. W. G., *Knighton Rectory, Leicester.*
1906 Wickwar, Oswin S., *Charlemont, Gregory-road, Colombo, Ceylon.*
1903 Wiggins, Clare A., M.R.C.S., *Entebbe, Uganda.*
1896 Wileman, A. E., H.B.M. Consul, *Manila, Philippine Islands.*
1910 Willcocks, Frank C., Entomologist to the Khedivial Agricultural Society, *Cairo, Egypt.*
1911 Williams, C. B., *Mostyn-road, Merton, Surrey.*
1894 Wolley-Dod, F. H., *Millarville P. O., Alberta, N.W.T., Canada.*
1900 Wood, H., *Kennington, near Ashford, Kent.*
1881 Wood, The Rev. Theodore, *The Vicarage, Lyford-road, Wandsworth Common,* S.W.
1905 Woodbridge, Francis Charles, *The Briars, Gerrard's Cross, S.O., Bucks.*

1888 Yerbury, Colonel John W., late R.A., F.Z.S., (Council, 1896, 1903–5), *Army and Navy Club, Pall Mall,* S.W.
1892 Youdale, William Henry, F.R.M.S., 21, *Belle-Isle-street, Workington.*

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ERRATA.

TRANSACTIONS.

Page 75, line 3 from top (excluding Head-line), *for* Biskra *read* Bône.

Page 90, line 7 from bottom, for *edentata* read *tridentata*.

Page 105, line 5 from top, for *Echium* read *Sedum*.

Page 130, line 13 from top, for *rotundifolia* read *rutæifolia*.

Page 130, line 2 from bottom, for *rotundifolia* read *rutæifolia*.

Page 131, line 19 from top, for *Chlorophora* read *Chrozophora*.

Page 133, line 7 from bottom, for *Chlorophora* read *Chrozophora*.

Page 196, line 19 from top, for *Spoelotis* read *Spaelotis*.

Page 456, under *Anommatus* 12-*striatus*, Müll. This paragraph should read—

"Mr. E. A. Fitch exhibited an apparently new species of *Belytidae*, captured by the Rev. A. Matthews among a colony of *Anommatus* 12-*striatus*, Müll., in rotten wood at a depth of three to four feet below the surface of the ground" (Meeting of Ent. Soc., July 5th, 1882; Proceedings, pp. xii, xiii).

Page 463, lines 4, 5 and 9 from top, for *Cephalonomyia* read *Cephalonomia*.

Page 467, line 14 from top, for *Aulicus* read *Aulacus*.

Page 472, line 15 from bottom, for *Gallerucella* read *Galerucella*.

Page 477, line 14 from bottom, *for* Apium *read* Apion.

Page 488, top line, for *Rhopalomestes* read *Rhopalomesites*.

Page 517, line 17 from bottom, } for *Wittlesia* read *Witlesia*.
Page 518, line 11 from bottom, }

Page 555, line 15 from top, for *flavirons* read *flavifrons*.

Page 555, line 14 from bottom, for *abicollis* read *albicollis*.

Page 607, line 6 from bottom, }
Page 609, line 5 from top, } for *melampogon* read *melanopogon*.

Page 621, line 8 from top, for *pasillus* read *pusillus*.

Page 749, lines 2 and 3 from bottom, transpose *crinanensis* and *americana*.

Page 754, line 9 of Table, *for* i–xiii *read* i–xxxv.

Page 763, line 8 from top, *for* Jan. 1st, 1841 *read* Feb. 1st.

Page 763, line 5 from bottom (excluding note), *for* Dec. 1st, 1846 *read* Jan. 1st, 1847.

Page 763, in last two dates, *for* 1847 *read* 1848.

PROCEEDINGS.

Page lxiii, line 10 from bottom, *for* Omi *read* Oni.

Page lxx, top line, *for* South *read* North.

Page lxx, line 3 from top, *for* Mr. G. V. Hudson, F.E.S., *read* Mr. Creagh O'Connor.

Page lxxx, line 5 from top, for *comi* read *comis*.

PLATES.

Plates XL and XLIV, for Wittlesia *read* Witlesia.

Plates XXXV—XLIV. The photographs are by Mr. F. Noad Clark, and are attributed in error to Mr. A. E. Tonge.

In Plates LVI and LVII the names of the species figured have been transposed. Plate LVI represents *Hydroecia americana*, and Plate LVII, *H. crinanensis*.

THE

PROCEEDINGS

OF THE

ENTOMOLOGICAL SOCIETY

OF

LONDON

FOR THE YEAR 1911.

Wednesday, February 1st, 1911.

Mr. G. T. BETHUNE-BAKER, F.L.S., F.Z.S., in the Chair.

Nomination of President.

REV. G. WHEELER, one of the Secretaries, announced that the Council had nominated the Rev. F. D. MORICE, M.A., for the Presidency for the current year.

Exhibitions.

SPECIES OF THE GENUS HELICONIUS.—Mr. W. J. KAYE exhibited the following species of *Heliconius*: *H. plesseni*, *H. melpomene aglaope* form *rubripicta*, *H. melpomene aglaope* form *adonides*, *H. plesseni niepelti* of Group I, *H. notabilis* and *H. erato estrella* form *feyeri* of Group II. It was remarked that until the recent discovery of these newer forms, *H. notabilis* had always been considered as a very constant and well-differentiated species. In 1908 Riffarth separated the very similar *H. plesseni* from *H. notabilis*, and in the same year Niepelt described the remarkable new forms of both these species with streaked hind-wing; *H. rubripicta* and *adonides* being streaked like *H. melpomene aglaope* in Group I, and *feyeri* and *ilia* being streaked like *H. erato estrella* in Group II. It seemed now to be possible and even likely that *H. melpomene aglaope* would eventually be proved to be

linked with *H. plesseni* through these newly-discovered forms, and that this species would then have to be sunk as a subspecies of *H. melpomene*. Similarly, *H. notabilis* through *ilia* and *feyeri* was probably only a subspecies of *H. erato*, though the material was insufficient at present to form a conclusion. All these different forms were from eastern Ecuador.

A NEW TACHYPORUS.—Dr. NICHOLSON showed two specimens of *Tachyporus fasciatus*, nov. sp., taken at Wicken Fen from under sedge-refuse, the one in April, the other in August 1910. This species is intermediate between *T. solutus*, Er., and *T. chrysomelinus*, L. It differs from the former in the shape of the antennae, which are of the same length, but are not thickened towards the apex ; by its finer puncturation throughout ; by the pronounced broad black band on the elytra ; and by the fact that the marginal bristles of the elytra are long and stout, as in *T. chrysomelinus*, and not short and fine, as in *T. solutus*.

VARIATION IN LUPERINA GUENEEI.—Mr. HY. J. TURNER exhibited several very interesting forms of the little-known species *Luperina gueneei*, sent to him for examination by Mr. A. MURRAY of St. Anne's-on-Sea, Lancashire, and with them he showed both fresh and worn examples of various forms of *L. testacea*, a closely-allied species with which it had been placed by Guenée, when first discovered many years ago. He communicated the following note :—

"Doubleday described *L. gueneei* as a species (Ent. Ann., 1864, p. 123), but it has always been confused with *L. testacea*. An examination and comparison of series of these two species seem to make it quite impossible to confuse them ; the facies of *L. testacea*, on the one hand, is very constant and quite distinctive, while, on the other hand, the delicate soft texture of the surface of *L. gueneei* is equally distinctive. The two new forms exhibited are much more markedly distinct, both from the type and from each other, than is the so-called var. *baxteri*, of which the difference from the type form has been recently expressed as 'merely due to the pale grey ground-colour having, in course of time, assumed a somewhat ochreous tinge.' In passing I may say that an examination of the quite fresh and worn examples of both the

typical *L. gueneei* and the var. *baxteri* in the box quite dispels this view.

"The first of the new forms to which I wish to call attention is quite typical *L. gueneei* in texture, shade of colour, and in markings, with this very marked difference, that the submarginal area, between the dark marginal lunules and the submarginal line, is much paler than any other portion of the wing, throwing out by contrast these dark lunules very conspicuously. In the worn specimen this feature is even more apparent than in the perfectly fresh example. In var. *baxteri* I note that this same area, instead of being lighter or uniform with, is distinguishably darker than the general wing-colour. I have called this new form ab. *murrayi*, from its captor.

"The second new form, of which there are three specimens in the box, are undoubted *L. gueneei* in all their characters but depth of colour. I believe these are the first melanic specimens which have been obtained so far. All the markings are much intensified, the ground-colour is much darker than in typical examples, very dark grey with, in a good light, faint flushes of a ferruginous tint. The contrast between ground-colour and markings is very much stronger than in any of the other forms. In the worn specimen of this form this contrast appears almost equally strong. There is no trace of the 'ochreous tinge' of the type nor of the typical 'pale grey ground-colour.' This form being so distinct, I have thought it might well be termed var. *fusca*."

Varieties of Coleoptera.—Mr. G. C. Champion exhibited on behalf of Mr. J. H. Keys the black variety of *Athous haemorrhoidalis*, F., from Dartmoor, recorded by the latter in the Ent. Mo. Mag., xlvi, p. 262 ; and also a red variety of the ♂ of *Agabus bipustulatus*, L., from the same locality.

Polygonia c-album, var. hutchinsoni in the 2nd brood.—The Rev. A. T. Stiff, who was present as a visitor, was introduced by Dr. Chapman, and exhibited some 2nd-brood specimens of the var. *hutchinsoni* of *Polygonia c-album*. He remarked that they were bred from Wye Valley larvae, received from Mr. L. W. Newman, F.E.S., Sept. 24th, 1910. The larvae fed upon nettle, and pupated between Oct. 1st and Oct. 10th. Emergence commenced on Oct. 16th, and the last butterfly

appeared Oct. 26th. Of the twenty specimens which emerged, 10 are referable to var. *hutchinsoni*, and 10 are normal, the latter showing both the variegated and plain undersides. Of the var. *hutchinsoni*, three appear to be intermediate between that var. and the type, the undersides of the wings being distinctly var. *hutchinsoni*, and the uppersides not distinguishable from the type. The vars., including the intermediates, emerged on October 16th, 19th (3), 20th, 21st (2), 22nd, 23rd and 26th, 1910. It is believed that there is no record of var. *hutchinsoni* having ever been bred in the *2nd brood* of *c-album*. Mr. Newman writes: "I have bred thousands of *c-album* of the second brood in various years, and never one *hutchinsoni*, and I have never heard of any one else doing so." He added that by the kindness of Mr. Newman he was enabled to show a series of 1st brood var. *hutchinsoni* for comparison.

Mr. H. Rowland-Brown and the Chairman both observed that on the Continent they had taken hybernated specimens of *P. c-album* of the *hutchinsoni* form.

Papers.

Dr. O. M. Reuter communicated a paper entitled "Bryocorina nonnulla Aethiopica descripta ab O. M. Reuter et B. Poppius."

Commander Walker, one of the Secretaries, read a paper on behalf of Col. Manders, entitled "A factor in the production of mutual resemblance in allied species of butterflies: a presumed Müllerian combination of *Euploeas* in South India and *Amauris* in South Africa."

The methods adopted in his experiments, and the conclusions drawn from them by the author, were to some extent the subject of criticism both by Mr. G. A. K. Marshall and Dr. Chapman. Mr. Merrifield added a few observations with regard to the comparative immunity of Pierine butterflies from the attacks of birds.

Vote of Condolence.

A vote of condolence with the family of the late Mr. J. W. Tutt was moved from the Chair, all the Fellows present signifying approval by rising.

Wednesday, March 1st, 1911.

Mr. G. T. Bethune-Baker, F.L.S., F.Z.S., in the Chair.

Election of Fellows.

The following gentlemen were elected Fellows of the Society: Messrs. Lionel Armstrong, Government Entomologist to the Gold Coast, Gold Coast, West Africa; J. Platt Barrett, 30, Endwell Road, New Cross, S.E.; the Rev. Henry William Brutzer, B.A., Great Bowden Vicarage, Market Harborough; Messrs. P. P. Graves, Club de Constantinople, Constantinople; Thien Cheng Kung, Guardian Superintendent of Chinese Students in British India, c/o the Curator, Mysore Government Museum, Bangalore, India; the Rev. A. Miles Moss, Helm, Windermere; Dr. Cuthbert F. Selous, M.D., M.R.C.S., L.R.C.P., Agra, Barton-on-Sea, New Milton, Hants.

Exhibitions.

A Beetle New to Britain.—Dr. Nicholson showed six specimens of *Choleva fuliginosa*, Er., an addition to the list of British beetles, from Alphington, Devon. This species closely resembles *C. nigrita*, Er., from which it differs by the posterior border of the thorax being slightly bisinuate, and its posterior angles produced backwards. The anterior tibiae of the ♂ are also broadly and abruptly dilated in the middle of their inner sides. From *C. nigricans*, Spence, it differs by its smaller size, shorter antennae, less sinuate and produced thorax, and by the above ♂ character. This species is mixed in several collections with *C. nigrita*, and is probably widely distributed in this country. Mr. Dollman has taken it at Harrow, Mr. Donisthorpe at Hartlepool, Mr. Taylor in the Isle of Wight, and it is also in the Bates collection.

Larvae of Clearwings.—Mr. L. W. Newman exhibited some sticks (the off-shoots of birch stumps) containing larvae of *Aegeria culiciformis*, indicating a new way of collecting this species; from some of the sticks, a bird, probably the Great Tit (*Parus major*), had laboriously picked out the larvae.

Also sticks of *Salix capraea* containing larvae of *Trochilium bembeciforme*, one of these showing the cap formed over the hole prepared for emergence. This species is not usually supposed to form a cap. The larvae were not, as is generally thought, confined to living wood, some of those exhibited being in dead twigs. Also a living specimen of *A. culiciformis*, a species which the exhibitor remarked was easily forced.

The Hon. N. C. Rothschild remarked on the special interest of the exhibit of *T. bembeciforme*, observing that he was unaware of the formation of a cap by this species.

Teratological Specimens.—Mr. G. T. Bethune-Baker showed a specimen of *Erebia ceto* which had been swept from the herbage without its head, which was probably held fast by a spider; nine hours after capture this insect had still been capable of fluttering strongly. He also exhibited a specimen of *Erebia* var. *adyte*, with a half-developed right hindwing; a specimen of *E. eriphyle* with no left hindwing, and a *Melitaea varia* with no right hindwing; in the two latter there was no trace of the wing having ever been developed.

Flea Eggs.—Mr. A. Bacot communicated the following note:—At our meeting on the 16th Nov., 1910, the Hon. N. C. Rothschild pointed out the distinction between *Ctenocephalus canis* and *C. felis*. I had a few days previously examined the ova of fleas taken from a dog's, and also from a cat's bed, and found that they differed in size and shape. Imagines have now been reared from these eggs, and I find I have both the species exhibited by the Hon. N. C. Rothschild. Measurements are as follows—*C. felis*: length ·5 mm. to ·510 mm., width about ·310 to ·320 mm.; nearly but not quite circular in cross section. *C. canis* has a larger egg ranging from about ·540 to ·6 mm. in length, and from ·365 to ·375 in width. The difference is sufficient to be easily appreciable to the naked eye, when the eggs are close together on a slide. The egg of *C. fasciatus* (one of the rat fleas) is smaller and more slender, a very regular oval as a rule, ·560 to ·6 mm. in length, by ·3 mm. in width. It has a more shiny surface than that of *C. canis* which is dulled in comparison. The ova of *Pulex irritans* are larger again and vary consider-

ably in shape, some being almost regular ovals, others decidedly tapering. At the stage at which I am comparing them they are less white, appear slightly yellow when compared with *C. fasciatus*, from which they are easily distinguished under a low-power lens. One of the short oval variety measured ·560 mm. by ·320 mm., a blunt-ended oval. Two of the tapering form measured, the one ·630 by ·350 mm. at the blunt end, and ·275 mm. at the narrow end; the other ·650 by ·350 mm. at one end, and ·275 mm. at the other.

Papers.

Mr. A. Bacot read a paper entitled: "On the Persistence of Bacilli in the Gut of an Insect during Metamorphosis."

Commenting on this paper Dr. Chapman observed that among many points of interest, it suggested to him one which he did not remember to have seen mooted. In moulting (referring chiefly to Lepidoptera) provision for increase of size is not the only object in view, but also the removal of various possible microbic enemies. In "laying up" for a moult, a larva almost invariably first empties the alimentary canal; at the actual moult, not only the skin, but the lining membranes of the tracheae and of much of the alimentary canal are cast also. The threads drawn from the mouth and anus, consisting of the linings of the *primae viae*, often seem long enough to represent the whole tube; if this be so, then bacillary inhabitants would be got rid of, and in any case must be so to a great extent. It would be interesting to know what is the precise hiatus between the oral and anal portions, and what provision there is for establishing an aseptic condition of this portion of the tube.

Messrs. Ernest A. Elliott and Claude Morley communicated "A first supplementary paper on the Hymenopterous Parasites of Coleoptera."

Notice of Lecture.

The Rev. G. Wheeler, one of the Secretaries, announced that he had been requested by Professor Sedgwick to draw the attention of Fellows to the Inaugural Lecture to be

delivered the following day by Mr. H. Maxwell-Lefroy, at the Imperial College of Science and Technology, where he has lately been appointed Lecturer on Entomology.

Letter of Condolence.

The Secretary then read to the Society the following letter, received by Dr. Chapman from M. Charles Oberthür, one of the Honorary Fellows, with regard to the late Mr. J. W. Tutt.

"*Rennes, le* 11 *février*, 1911.

"Mon cher Collègue,—J'ai été très affecté en apprenant la mort de M. Tutt. C'est une perte immense pour l'Entomologie ! La capacité de travail dont était doué M. Tutt, faisait mon admiration. Les ouvrages qu'il a laissés sont des monuments impérissables, dans lesquels le savant Auteur a poussé l'analyse jusqu' aux limites les plus voisines de la perfection. M. Tutt se documentait avec un soin extrême ; il ne consentait à aucune ignorance ; il voulait tout connaître exactement. Je considérais sa bonne foi et sa sincérité comme absolues. M. Tutt emporte dans la tombe toute mon estime et tous mes regrets.

"Je vous prie, mon cher Collègue, de faire part de mes sentiments à nos honorables Collègues de la Société entomologique de Londres, de leur dire combien sympathiquement je m'associe au deuil de l'Entomologie anglaise.

"Veuillez agréer l'expression bien cordiale de tout mon affectueux dévouement.

"Charles Oberthür."

Special Meeting.

It was announced that a Special Meeting for the election of President would take place immediately before the Ordinary Meeting on March 15th.

Special Meeting, Wednesday, March 15th 1911.

Rev. George Wheeler, F.Z.S., Secretary, in the Chair.

The letter summoning the Special Meeting was read by the Chairman, and, no other Candidate having been proposed, the Rev. F. D. Morice, M.A., was declared to have been elected President for the current year.

Ordinary Meeting, Wednesday, March 15th, 1911.

Rev. F. D. Morice, President, in the Chair.

The President, on taking the Chair, addressed a few words to the Society, thanking them for their choice of him for the post, and expressing regret for the circumstances which had made an election necessary.

Election of Fellows.

The following gentlemen were elected Fellows of the Society:—Messrs. George Moffatt Carson, Entomologist to the Government of New Guinea, Port Moresby, New Guinea; Alfred George Scorer, Hill Crest, Chilworth, Guildford; Percy William Affleck Scott, Chinese Imperial Customs Service, Hangchow, China; Noel Stanton Sennett, 32, Bolton Gardens, South Kensington, S.W.; James A. Simes, 2, The Byre, Whitehall Road, Woodford, Essex; P. H. Tautz, Cranleigh, Nower Hill, Pinner, Middlesex; R. G Todd, The Limes, Hadley Green, N.; R. Vitalis, Commis de 1re classe, Trésor, Pnom-Penk, Cambodia, French Indo-China; Rev. W. G. Wittingham, Knighton Rectory, Leicester.

Appointment of Vice-Presidents.

The President announced that he had appointed Dr. F. A. Dixey, M.A., M.D., F.R.S., and Messrs. G. T. Bethune-Baker, F.L.S., F.Z.S., and H. St. J. Donisthorpe, F.Z.S., to act as Vice-Presidents for the current year.

Exhibitions.

Queen Ants in Nests of other Species.—Mr. H. Donisthorpe exhibited a nest of *Lasius umbratus*, Nyl., which had accepted a ♀ *L. fuliginosus*. The *umbratus* nest was dug up by Mr. Crawley and the exhibitor at Weybridge on December 8th, and contained about 400 ☿ ☿ and thirty virgin (winged) ♀ ♀. On December 13th a deälated ♀ *L. fuliginosus* was put into a small plaster nest with a dozen of the *umbratus* ☿ ☿; she was slightly attacked, but not in any way injured, and tried to conciliate the ☿ ☿ by stroking them with her antennae; she protected her waist by crossing the back legs over it, and her neck by pressing the head back against the thorax. The *umbratus* ☿ ☿ were increased to over twenty, and on December 20th the *fuliginosus* ♀ and all the ☿ ☿ were introduced into the big nest. She endeavoured to join the *umbratus* where they were most numerous, and some of those that had previously been with her protected her when any of the others endeavoured to attack her. By December 21st she was accepted by the whole nest, and has been treated as their queen ever since. Only one or two ☿ ☿ occasionally threatened her with their jaws, though the first *fuliginosus* ♀ placed in the nest was killed. The ☿ ☿ killed most of their own virgin ♀ ♀.

Mr. W. C. Crawley also exhibited a case containing a colony of *Lasius umbratus* with a *L. fuliginosus* ♀ as queen, a case of "temporary social parasitism" suspected, but not hitherto demonstrated. The other half of the case contained, for comparison, a colony of *L. niger* with a *L. umbratus* queen, a similar case of "temporary social parasitism" known to the exhibitor since 1896. He mentioned that deälated ♀ ♀ do not always behave as if fertilised, the ♀ in this nest being restless, as the winged ♀ ♀ are before the marriage flight.

Dr. Chapman began a discussion as to whether this form of "parasitism" was in the long run profitable to the parasitised species, by weeding out the weaker nests; the President, Mr. Verrall, and Mr. G. A. K. Marshall also joined in the discussion.

Temperature Experiments on Pupae.—Mr. F. Merrifield exhibited a box of specimens of *Selenia bilunaria*, and read the following note on the question whether temperature in the

pupal stage may affect the size of the imago in some Heterocera.—"I exhibit 134 specimens of *Selenia bilunaria*, belonging to five separate 'families' (by a 'family' I mean offspring of the same parents), some of the pupae of each 'family' having been at a 'forcing' temperature, about 80° F., the rest of each family at a 'cool' temperature, about 42° to 53° F. In looking through my rather numerous collection of the effects of temperature on geometrid moths I had been struck with the apparent difference in size between those in which the pupae had been forced and those in which they had not been forced. This seemed to me especially marked in the cases of *Selenia bilunaria* and *S. tetralunaria*, but it seemed also more or less noticeable with *Pericallia syringaria* and some of the genus *Zonosoma*, including *Z. punctaria*.

"The difference in mass between the summer and the winter phase of *Selenia* is well known, and in a paper I read before the International Entomological Congress at Brussels last year I gave reasons for the conclusion that the cause of this difference is temperature in the *larval* stage. But the specimens I am now exhibiting appear to indicate that temperature during the *pupal* stage may cause substantial difference in mass, at least so far as wing-expanse may be taken as a measure of that. Knowing, however, how deceptive general appearance often is, and in order to be sure of my facts where the circumstances admitted of certainty, I selected as many as five families which struck me as indicating this difference in a marked degree, and I caused the wing expanse of each individual to be carefully measured by a qualified observer, Mr. Ricks, one of the staff of the Brighton Municipal Science College. The measurements were made with a Vernier microscope, reading to $\frac{1}{1000}$ part of a centimetre, but I am informed that the results cannot be relied upon to a greater accuracy than $\frac{1}{100}$ of a centimetre, *i. e.* about $\frac{1}{250}$ of an inch. The following tables epitomise the results—

	Males					Females				
	Cooled.		Forced.			Cooled.		Forced.		
Family	No.	Average expanse	No.	Average expanse	Percentage Difference.	No.	Average expanse	No.	Average expanse	Percentage Difference.
I	6	3·93	2	3·88	1·3	7	4·11	4	3·89	5·7
II	2	3·84	6	3·18	20·8	3	4·23	2	3·86	9·5
III	9	3·83	3	3·47	10·4	9	4·17	9	3·88	7·5
IV	12	3·87	4	3·45	12·2	17	2·93	7	3·95	0·7
V	10	3·77	8	3·32	13·6	14	3·85	4	3·80	1·3
All	39	3·84	23	3·37	13·6	46	4·02	20	3·89	3·3

"Treating all the families as one family, the results are as follows :—

No.	Description.	Average wing expanse.	Increase of the cooled.	Percentage of increase.	
39	Cooled males	3·84	·47	13·9	Males
23	Forced males	3·37			
46	Cooled females	4·02	·14	3·6	Females
26	Forced females	3·88			

"It will be observed that in every one of the five families the cooled are, on the average, larger than the forced, the difference ranging in the males from 1·3 to 20·8 per cent. (averaging 13·6 or 13·9), in the females from 0·7 to 9·5 per cent. (averaging 3·3 or 3·6). It seems to me that the difference is too great and too diffused, embracing, as it does, each sex in five separate families, to be explained in any other way than this: that it is caused by something that, in consequence of the difference in temperature, happened to either those forced or those cooled, or both of them, in the pupal stage. The only loophole I can see for error in this explanation is that the whole of the families were not preserved, some having been sacrificed for breeding purposes, so it may be that a larger proportion of those forced was preserved than of those cooled. The differences of aspect—colour, intensity, and to some ex-

tent form of markings—caused by pupal temperature are of course well recognised, and these differences are fully exemplified in the exhibits. But I think they show also other differences partaking of a structural character. Those which have been cooled appear to me to be more strongly denticulated, though, before fully accepting this view, I think there should be careful measurement; and there is certainly a difference in the thickness of the scaling, as may be perceived by holding them up to the light, those forced appearing more opaque than the others, and having a smoother surface.

"I should perhaps mention that the imagines I exhibit all seemed healthy and vigorous, and that, besides these families, I have many others that appear to show similar results, and in no one of these other families, of which I have a large number, have I been able to observe any directly opposite results. I should be very glad if those who have the opportunity would test the results, especially as regards mass, and suggest that this might be done by weighing a large number of forced pupae and of cooled pupae, shortly after pupation, and again shortly before emergence. The great difficulty here would be with the forced ones, as their pupal period would be only about ten days, but it is no greater than close watching could cope with. The summer pupae, producing the summer phase, are much more amenable to temperature than those pupating in autumn, and I should be happy to supply eggs this spring to those who have the means of trying this experiment accurately and are willing to do so. If I had consulted only my own reputation I should have held back this paper until I could have made further research, with particular reference to the points on which I have suggested further inquiry, but I am afraid that if I waited for that it might never be done; and I do think that there is sufficient in the facts I have put forward to justify me in bringing the matter before the Society as one worthy of consideration and of further observation."

There was a short discussion on the subject, in which the Rev. G. Wheeler, Dr. Longstaff, and Dr. Chapman joined.

Stereoscopic Photograph.—Mr. H. Main exhibited a stereoscopic photograph of the cocoon of *Chrysopa flava*,

opened to show the hybernating larva, and of the larva taken out of the cocoon to show how it lies coiled up with its tail over its head.

Gigantic Psychid Cases.—Mr. O. E. Janson exhibited larvae and cases of a Psychid from Amboyna, the cases being beautifully constructed and closely covered on the exterior with small spines, intermixed with larger spines or thorns. The largest of the cases measured 9 ins. in length.

Paper.

Dr. Chapman read a paper on "The British and a few Continental Species of the Genus *Scoparia*," and showed photographs of the genitalia, and a drawing to illustrate the neuration.

Conversazione.

The Secretary announced that the Conversazione was fixed for Wednesday, May 17th, and that the Linnean Society had kindly placed their Rooms at the disposal of the Society for that occasion, and were generously lending their lantern, making no charge for light or for the current for the lantern. He also announced that Professor Poulton and Mr. Enock had consented to give lectures on that occasion. As the arrangements with the Linnean Society preclude the sale of tickets, it will be necessary to ask for a subscription towards the expenses (for refreshments, printing, postage, &c.) from those who apply for them, and also strictly to limit the number for which each Fellow may apply. Details will shortly be circulated.

Vote of Thanks.

On the motion of Mr. Rowland-Brown, seconded by the Rev. G. Wheeler, a vote of thanks was unanimously passed to the President and Council of the Linnean Society for their kindness and generosity, and the Secretary was instructed to convey to them a notification of the same.

Wednesday, April 5th, 1911.

The Rev. F. D. Morice, M.A., President, in the Chair.

Election of Fellows.

The following gentlemen were elected Fellows of the Society: Messrs. H. W. Davey, Inspector of the Department of Agriculture, Geelong, Victoria, Australia; H. Boileau, 99 rue de la Côte St. Thibault, Bois de Colombes, Seine, France; Rufus Mallinson, Oakland, Windermere.

Obituary.

The President announced the death of Mr. P. C. T. Snellen, of Rotterdam, the oldest Honorary Fellow of the Society, and moved that an expression of sympathy be forwarded to his family; this was seconded by Mr. Gahan and carried unanimously.

Exhibitions.

Canadian Pierids.—Mr. Robert Adkin exhibited on behalf of Mr. Lachlan Gibb of Montreal, Canada, three specimens (two males and one female) of a *Pieris* taken by Mr. Gibb at Lost River, Canada, in May 1910, together with series of *P. oleracea* and *P. rapae* from the same and other Canadian localities for comparison. Mr. Gibb, in forwarding the specimens, had pointed out that the three in question differed from *P. oleracea* in having the body more grey, the base, and in the case of the female the apices of the forewings, more suffused with grey, and in the female having spotted forewings; also that their habits in the field were different, in that their flight was more robust, and that they inhabited open grassy places, whereas *P. oleracea* was found only in woods. He also mentioned that *P. rapae* was not an indigenous species, but was said to have been introduced into Canada some sixty years ago, and had not only thoroughly established itself, but had become one of the commonest butterflies, whereas *P. oleracea*, an indigenous species, appeared to be rapidly declining in numbers, and it had been suggested that the introduced species was driving it out. He

asked the opinion of the fellows upon the three specimens, and suggested the possibility of their being the result of natural hybridisation between *P. oleracea* and *P. rapae*.

Dr. Dixey was of opinion that the three specimens in question were certainly not hybrids, and even probably only a variety of *P. oleracea*; he pointed out that they differed less from the *P. oleracea* exhibited than did the series of *P. rapae* from one another. Mr. Rowland-Brown observed that the greater or less amount of grey suffusion was a common form of variation in the genus. Dr. Longstaff agreed with Dr. Dixey, and remarked that *P. rapae* was certainly not an indigenous species in Canada.

Earwigs from Hyères.—Mr. W. J. Lucas showed three specimens of *Euborellia moesta*, Géné, received on April 3rd from Hyères, from Dr. Chapman, with four others of the same species. Both sexes were shown; but they look rather alike owing to there being little difference in the callipers. *E. moesta* is quite black. There are just the rudiments of elytra, but no wings. Antennae dark fuscous, legs partly so, partly black. He remarked that *A. annulipes*, which Commander Walker takes in Kent, is something like this, but not so dark, and without rudimentary elytra; it has also some white segments to the antennae.

Central American Neoponerid.—Mr. Lucas also exhibited a large ant, one of three specimens found this year at Swanage in a bunch of bananas, supposed to have come from Jamaica.

The President observed that the specimen belonged to the genus *Neoponera*, and was probably *N. theresiae*, Ford, a Central American species. He added that the genus was a curious one, combining the possession of a sting with the single abdominal node characteristic of the stingless ants.

Bat and Parasitical Dipteron.—Mr. F. Muir exhibited two specimens of the bat *Miniopterus schreibersi*, with ♀ *Ascodipteron* embedded at the base of the ear. He also showed specimens and enlarged drawings of the ♂, ♀ winged and wingless, larva and puparium of the *Ascodipteron*, and read the following note:—"These all came from Amboyna (Dutch E. Indies). The male and winged female hatch out as normal imagines; the female, after finding her host, cuts her way

under the skin at the base of the ear, and then casts her legs and wings; her abdomen then develops to an enormous extent, and entirely envelops her head and thorax, so that she appears as a 'bottle-shaped' grub without legs or head. The larvae develop in the uterus in the usual pupiparous manner, and when full grown pass out through the vagina and fall to the ground, where they immediately pupate, hatching out as imagines in about thirty to thirty-one days. This species I have named *Ascodipteron speiserianum*, after Dr. Paul Speiser, the authority on this group of flies. I took another species in North Queensland, living on the same species of bat."

Forced Aphantopus hyperanthus.—Mr. L. W. Newman exhibited, on behalf of Mr. G. B. Oliver, of Wolverhampton, a series of *A. hyperanthus* bred during January and February, 1911, from ova laid by a Leamington ♀ in July, 1910. The larvae were fed in glass-topped metal boxes in a warm room (the fire being out at night). The specimens, though rather small, showed a great tendency to produce large spots both on the upper and under side. A few captured specimens from the same locality, selected for prominent spotting, served to add emphasis to this tendency in the forced specimens.

Longicorn Beetle from Hyères.—Mr. H. J. Turner exhibited living specimens of a Longicorn Beetle, *Agapanthia asphodeli*, sent by Dr. Chapman from Hyères.

Commander Walker observed that he had found it in Malta (the only common longicorn there), and also at Gibraltar in the early spring, and always on asphodel.

Wednesday, May 3rd, 1911.

The Rev. F. D. Morice, M.A., President, in the Chair.

Obituary.

The President announced the death of two Fellows of the Society, the Rev. Canon Cruttwell, and Mr. W. A. Rollason, and said a few words with regard to the career of each. Dr. Dixey also gave a short appreciation of Canon Cruttwell.

Resolutions.

The PRESIDENT informed the Society that the authorities of the Science Museum had persuaded the Government to allow them to take a portion of the land belonging to the Natural History Museum at South Kensington, for the purpose of erecting new buildings of their own, thereby precluding much-needed additions to the Natural History Museum, especially in the Entomological Department, and called on Mr. G. T. BETHUNE-BAKER to submit to the Society a Resolution on the subject, which had already been unanimously passed by the Council.

Mr. BETHUNE-BAKER fully explained to the Society the position of affairs. He said that owing to differences of opinion which had arisen between the authorities, the land in question had been definitely assigned in 1899 to the Trustees of the British Museum (of which the Natural History Museum is an integral part), and that the Spirit Building had been erected on this land at a cost to the nation of about £35,000. The Trustees of the British Museum had now been asked to hand this land over to the Science Museum, and on their refusal had been over-ridden by the Government. In order to strengthen the hands of the Trustees, it was hoped that all the Societies interested in Natural History would pass Resolutions against this forcible expropriation, since the Spirit Building would have to be erected (at much greater cost and of about twice its present size) on the only ground available for extending the Zoological, and especially the Entomological, accommodation of the Museum. He then read the following Resolution :—

"The Council and Fellows of the Entomological Society of London have heard with grave anxiety that it has been proposed to build a part of the contemplated extension of the Science Museum on land belonging to the Natural History Museum. It has been represented to the Society that this would involve the demolition of the Spirit Building, and its re-erection between the main part of the Museum and one of the public roads.

"It appears to the Society that the rebuilding of the Spirit Room in this position would involve the occupation of ground

which it has hitherto been permissible to regard as available for the extension of the main building, and particularly of the Insect Rooms, in which they feel themselves justified in taking a special interest.

"They would point out that the collections of Insects contained in the Natural History Museum form at present but an inadequate and incomplete representation of Entomology. Recognising as they do that the rooms in question are already filled almost to their utmost capacity, and that the space which can be put at the disposal of the many students of this branch of Zoology has been seriously restricted of late by the growth of the collections, the Society feel themselves justified in expressing to the Trustees of the British Museum the hope that they will take every possible step to avoid the calamity that would be implied by the diminution of the area available for the enlargement of the Museum."

He further moved that a copy of the Resolution be sent to each of the Trustees of the British Museum, to the Prime Minister, and to the President of the Board of Education.

Dr. Dixey, in seconding the motion, remarked that an attempt had been made on the part of some of the authorities at the Science Museum to represent Zoology as a matter of small account in comparison with the Chemical Sciences. He deprecated such comparisons, but remarked that in this case they were wholly beside the mark; that a bargain is a bargain, and that the land in question having been assigned by the Government to the Natural History Museum when the matter was under discussion, there ought to be no possibility of its being taken away for the purposes of any scientific or other body whatever, especially when it is so badly needed by the body in actual possession.

Mr. C. O. Waterhouse explained a large plan which he had prepared of the Zoological portion of the Museum, showing the piece of land which the Government propose to alienate, the position of the present Spirit Building, the proposed site for its re-erection, and the only possible site for the extension of the Zoological wing, and pointed out how the latter would be cramped, and the very necessary light shut out, by the proposed new position of the Spirit Building. He added that the

whole of the present Entomological Rooms, utterly inadequate as they are, were only a makeshift, the original plan of the Museum regarding them as mere store-rooms. He also read a letter showing how far the scheme of spoliation had already advanced, and how urgent was the necessity for immediate action.

The Rev. G. Wheeler added that, bad as things looked if the Spirit Building were erected on the proposed site close to Queen's Gate, yet they would be even worse in the very possible event of the owners of the land or houses at the other side of the road objecting to the close proximity of the Spirit Building, as it would then have to be pushed further back towards the Museum, not merely reducing and damaging the available space for extension, but making it totally impossible to build any extension at all.

The resolution was carried unanimously.

Mr. H. Rowland-Brown then moved that "If a deputation be appointed to wait on Mr. Runciman with regard to this matter, the Officers and Council of the Entomological Society desire to be represented on it."

This was seconded by Mr. Bethune-Baker and carried unanimously, and Mr. C. O. Waterhouse said that he would see that it was made known in the right quarters.

Exhibitions.

A Rare British Beetle.—Commander J. J. Walker exhibited, on behalf of Mr. Geo. Brown, of Coatbridge, Lanarkshire, living specimens of *Helophorus tuberculatus*, Gyll., hitherto exceedingly rare as a British insect. These were taken by Mr. Brown at the end of April, walking about on bare dry peaty soil on the moors near Coatbridge.

Abnormal Beetle.—Mr. O. E. Janson exhibited a new and remarkable Lamellicorn beetle, belonging to the *Cremastochilides* group of the *Cetoniidae*, in which the anterior tarsi were unmistakably six-jointed. He believed this was the first known instance in the whole of the Coleoptera where the tarsal joints exceeded five. The specimen was received in a collection made by Dr. Bayon in Uganda, and sent to him for determination by Dr. Gestro, the Director of the Civic Museum, Genoa.

Mr. C. O. Waterhouse suggested that it was probably an abnormal specimen, six-jointed tarsi being so far unknown in Entomology. Mr. G. C. Champion expressed concurrence in this opinion.

Varieties of Aplecta nebulosa.—Mr. A. Harrison exhibited a drawer of Delamere Forest *Aplecta nebulosa*, bred last year from var. *robsoni* ♂ and var. *thompsoni* ♀, by himself and Mr. H. Main. He said: "Only fifty moths were bred, 26 % of the grey form, 42 % of *robsoni* and 32 % of *thompsoni*. This result quite negatives our idea that the form *robsoni* was a heterozygote, or hybrid (so called) and that the grey form and *thompsoni* were homozygotes, or pure. We had been led to this conclusion by the results previously reported as being obtained by ourselves and by Mr. Mansbridge. From a large brood, both parents *robsoni*, we had previously bred 25 % grey, 51 % *robsoni*, and 24 % *thompsoni*, obviously Mendelian proportions. From several broods, both parents grey, we had bred only the grey form. From the grey form crossed with *thompsoni*, Mr. Mansbridge had obtained only *robsoni*, and from the grey form crossed with *robsoni* he had bred 50 % *robsoni* and 50 % grey. These two latter broods were very small, but all the results pointed to the conclusion mentioned above, and appeared to be parallel to the well-known case of the Andalusian fowl, where we have also three forms, a black, a white (splashed with black or blue), and a blue, the latter being the hybrid, and the two former being pure. However, the results obtained last year show that the problem is not so simple as this, and that it will require further experiments before it can be solved."

Females of Lasius mixtus.—Mr. Donisthorpe exhibited three ♀♀ of *Lasius mixtus*, Nyl., a race of *L. umbratus*, Nyl., and a ♀ of the latter for comparison. He remarked that there were only two records of its capture in Britain—at Bickleigh, near Plymouth, by Bignell, and in the Isle of May by Grimshaw, who both recorded ♂♂, ♀♀, and ☿☿. One of his specimens was taken at Weybridge last year, and another at Mickleham, in company with Mr. Crawley, where they each took a specimen last month. The third was captured this year by Mr. Dollman in Richmond Park. He pointed out

the difference between this race and *umbratus*, and said it was probably widely distributed. He added that Mr. Evans had sent him ♀ ♀ and ♂♂ from the Isle of May to name.

Agriades thetis ab. coelestis.—Mr. H. Rowland-Brown brought for exhibition examples of *Agriades thetis* (*bellargus*) ab. ♀ *coelestis*, Obthr., taken last August at Dompierre-sur-Mer, Charente-Inférieure. He said that so far as is known at present, this brilliant form of the blue ♀ is confined in western Europe to the west and south-west of France; roughly speaking, between the valley of the Loire and the Gironde, where it occurs locally not unfrequently; the blue form of *A. coridon* ♀, var. *syngrapha*, also being found in the same calcareous region. Examples from Angoulême, Charente, and from Auzay, Vendée, as well as from Dompierre-sur-Mer, are figured by M. Charles Oberthür in his "Lépidoptérologie Comparée," fasc. iv, pl. xix.

Some New Species and Forms of Indian Butterflies.—Mr. G. W. V. de Rhé-Philipe exhibited several new Indian butterflies and communicated the following notes upon them:—

"*Euploea mulciber*, Cramer, var. *duarseri* ♂. The large Indo-Malayan genus *Euploea* is divided into several groups or sub-genera, according to the nature or position of the sex marks on the male insect. The new form falls into the sub-genus *Trepsichrois*, Hübner, in which the male mark consists of a large patch of specialised scales on the upperside of the hindwing. The only distinct representative of this sub-genus in India is the common *E. mulciber*, Cramer = *E. midamus*, L.; and, pending further material, the new insect is being treated as a distinct variety of this species. A full description of *duarseri* was published in the "Journal of the Bombay Natural History Society," vol. xx, p. 755. It differs from *E. mulciber*—a normal specimen of which is shown for purposes of comparison—in the almost entire absence of pale violescent spots on the upperside of the forewing—spots which are a constant and striking feature of the latter. The specimen was taken near the foot of the Bhutan Hills, in November, 1908.

"*Charaxes raidhaka*, mihi ♂. A detailed description of this new species appeared in the "Records of the Indian Museum,"

vol. ii, p. 285 (Oct., 1908), and a further note thereon was published in the "Bombay Natural History Society's Journal," vol. xx, p. 757. It is closely allied to the widespread Indian *C. fabius*, Fabricius, and approaches some of the Malayan forms of the genus. The type exhibited was taken up a hill-stream in dense forest on the Bhutan frontier (1500 ft.) in June, 1908. On another visit to the locality last year (1910) I saw what I am almost sure was another specimen; but the flight of all insects of the genus is extremely powerful and swift, and in the difficult country it evaded the net.

"*Euripus consimilis*, Westwood, new dimorphic ♀ form *torsa*. There are two species of *Euripus* in India—*E. consimilis*, Westwood, and *E. halitherses*, Doubleday. The ♀ of the latter is polymorphic, the various forms mimicking different species of the protected genus *Euploea*. Only one form of the ♀ of *E. consimilis* has hitherto been found; and the discovery that there is also a second, mimicking a protected species, is thus particularly interesting. The normal or common ♀ of *E. consimilis* possibly mimics a protected white Pierid. In the new form now shown, the indigo blue markings on the upperside of the forewing have been so extended as to become the base colour of the wing; and the insect, in flight, is almost indistinguishable from the protected *Euploea diocletiana*, Fab., also found in the locality. A full description of the new type of ♀ appears in vol. xx of the "Journal of the Bombay Natural History Society," p. 758. It was captured in forest country in the Bhutan Terai (500 ft.), in November, 1908. For purposes of comparison, a type specimen of the model *E. diocletiana* and one form of ♀ *Euripus halitherses* (named *E. isa*), which also mimics *E. diocletiana*, are also exhibited.

"*Cyaniris parishii*, mihi ♂. This new species of a most interesting genus was taken by me at an elevation of 5000 ft. in the Khasi Hills, Assam, during the rainy season. It was described in the "Journal of the Bombay Natural History Society," vol. xx, p. 763 (1910).

"*Nacaduba ardates*, Moore, var. *dima* ♂. This insect appears to be a somewhat distinct variety of the common Indian *N. ardates*. It differs from the parent form in the shade of purple on the upperside, and in the very dark tint and shorten-

ing of the basal striga on the underside. The specimen comes from the foot of the Naga Hills in N.E. India, and was described at p. 764 of the "Journal of the Bombay Natural History Society," already referred to.

"*Terias silhetana*, Wallace. The normal colouring of this species is, as shown in the example exhibited, a bright rich citron yellow. A quaint sport or aberration is also shown, in which the ground-colour is a very light creamy white, while patches and specks of the ordinary citron yellow are scattered irregularly over the wings."

Pieris oleracea and P. rapae.—Dr. Dixey, referring to Mr. Adkin's exhibit at the previous meeting, said that having examined the three specimens in question, he was decidedly of opinion that they were a form of *P. oleracea*; he added that although one specimen is spotted and two are not, all three are ♀ ♀.

Hybernia marginaria.—Mr. H. M. Edelsten exhibited three generations of *Hybernia marginaria*, being the result of a pairing between a dark ♂ and ♀ taken wild in Epping Forest in 1908. The 1909 brood did not vary much from the parents. The 1910 brood produced specimens with dark margins, and three unicolorous males. The 1911 brood produced specimens with lighter margins and dark interiors, but no unicolorous specimens. The darkest males and females were paired in each case. These dark forms have only appeared in Epping Forest the last few years.

Living Beetles.—Mr. G. C. Champion sent round living specimens of *Corymbites purpureus* and *Morimus lugubris*, taken by Dr. Chapman at Amélie-les-Bains, Pyrénées Orientales.

A Wood-boring Larva.—Mr. L. W. Newman showed a stick of *Salix capraea* containing larvae supposed to be those of the "Wood Wasp." He pointed out that the larvae make caps like *Aegeria andrenaeformis*, and that the cocoon is exactly like that of a "clear-wing," and the workings very like those of *Aegeria*.

A discussion arose on this exhibit, in which the President, Mr. Donisthorpe, Dr. Chapman, and other Fellows took part, and in which widely different views were expressed even as to the order to which the larvae in question belonged.

English Hyloicus Pinastri.—Mr. A. G. Scorer exhibited a specimen of *Hyloicus* (*Sphinx*) *pinastri*, of whose British origin he had no doubt. It was caught near Aldeburgh, and sent to him by John Bates, who had been in his employment as page-boy. Another specimen was taken at the same time, but this he had not seen.

Gynandromorphic Specimen.—Mr. Scorer also exhibited a gynandromorphic specimen of *Gonepteryx rhamni*, taken by himself at Salisbury, on September 2, 1894. It was evenly divided, the right side being ♀ and the left ♂.

Efficient Relaxing Boxes.—Dr. K. Jordan exhibited some insects from India in one of Mr. Newman's relaxing boxes, which had remained throughout their journey as fresh as if just captured, and were in perfect condition for setting. He remarked also that they were entirely free from mould or stain. These particular butterflies had been papered, but Dr. Jordan explained that it was better merely to place them between layers of cotton wool, as paper was apt to contain acids or other deleterious matter.

Interesting Lepidoptera.—Dr. Jordan also exhibited the Saturniid moth, *Dysdaemonia kadeni*, in its resting attitude. The hindwings are for the greater part concealed under the forewings, only the anal area and the tail projecting. The abdomen being bent towards the left side, the insect in this attitude resembles a crumpled dry leaf, and recalls the much smaller Bombycid—also exhibited—*Sorocaba anomala*, which, as is well known, assumes a similar attitude when at rest. He further exhibited a species of *Cosmosoma*, Family *Syntomidae*, partly covered with a white wool. According to the collector (A. H. Fassl), "the insect when touched ejects from a fold on the underside of the abdomen a white wool, which completely envelops the specimen." The hitherto unknown female of *Ogyris meeki*, Roths., a Lycaenid from New Guinea, was likewise shown, together with the male and several *Hypochrysops*.

A Well-arranged Collection.—Mr. Hawkshaw exhibited several drawers of Lepidoptera, beautifully arranged and set; placed on squared paper, and with the written history of every insect accompanying it. Mr. Hawkshaw explained that

the drawers were all interchangeable and were arranged perpendicularly like books, instead of horizontally as usual.

Papers.

Commander Walker, one of the Secretaries, communicated the following papers :—

"Some African and a few Australian Aculeate Hymenoptera in the Oxford Museum," by the late Col. Bingham, with a prefatory note by Prof. Poulton ; communicated by Rowland Turner.

"A contribution to the Life-history of *Hesperia* (*Syrichthus*) *sidae*," by Harold Powell.

"Biological Notes on Indian Pierine Larvae," by Capt. Frazer.

Wednesday, June 7th, 1911.

The Rev. F. D. Morice, President, in the Chair.

The South Kensington Site.

After reading the Minutes, the Secretary observed that he had exceeded his instructions with regard to the Memorial passed at the last meeting, and had sent it to the *Times*, where it had appeared, and to the principal Press Associations, as well as (at the request of Mr. Waterhouse) to the Director of the Natural History Museum. This was approved by the Meeting.

Vote of Thanks.

The President proposed that the thanks of the Society be given to the Rev. G. Wheeler for his work in connection with the Conversazione. Mr. Wheeler replied in a few words and gave an abstract of the accounts, showing that all expenses were paid, including those incurred for the postponed Conversazione last year, and that a small balance would remain.

Exhibitions.

Barypithes pellucidus.—Commander J. J. Walker exhibited specimens of *Barypithes pellucidus*, Boh., from Oxford,

Enfield, and Tavistock respectively, and for comparison, *B. duplicatus*, Keys, from the Blean Woods and Birchington, Kent.

Mr. F. B. Jennings remarked that he took *B. pellucidus* on buttercups and inquired whether any were present where these specimens were taken. Commander Walker replied that there were no flowers at all, only short grass, in the locality where his Oxford specimens were taken.

Myrmecophilous Lepidoptera.—Commander Walker also showed a series of specimens illustrating the life-history of *Cyclotorna*, Meyrick, a genus of Myrmecophilous Lepidoptera, from Queensland, sent by Mr. F. P. Dodd with his paper on the insects subsequently read.

Myrmecophilous Acari.—Mr. Donisthorpe exhibited live specimens of *Antennophorus uhlmanni*, Haller, on the ♀ ♀ from a nest of *Lasius umbratus* at Woking. Only two specimens have been taken before in Britain—by Michael, in an ants' nest at Land's End.

Also *Uropoda philoctena* fastened on the strigil of a ♀ of the same ant from the same locality. This species is new to Britain.

Probable New Species of Hypoderma.—Mr. C. O. Waterhouse exhibited larvae of a species of *Hypoderma* received by the Secretary from India from Mr. J. E. Middleton, with a note that they had been taken from a gazelle and were probably an undescribed species. Mr. Waterhouse took charge of them for the Museum, but expressed the strongest doubts as to the possibility of determining a species of *Hypoderma* from the larvae. There is, however, no Indian *Hypoderma* described hitherto.

A New Species of Mymar.—Mr. F. Enock exhibited a photomicrograph of a new species of *Mymar*, accompanied by one of *M. pulchellus* for comparison, and read the following note:—

"It is with no small amount of pleasure that I am able to record the discovery of another species of that most remarkable genus of ovivorous parasites, *Mymar*, Hal., popularly known as the Battledore-wing Fly, so named from the shape of the anterior wings, which resemble a long-handled battle-

dore, while the posterior pair are but mere bristles about one-sixth the length of the anterior, to which they are united by three small hooks.

"This new species I was fortunate in capturing last Saturday, June 3rd, 1911, at Burnham Beeches, where I had been sweeping for *Mymaridae*, but with very poor results—only twelve common species. Noticing some long grass, I swept it. Sitting down to examine the small heap of minute bits of sharp grass stems and seeds at the bottom of my net, I saw the familiar form of *Mymar* struggling to get free from the débris, and knowing that directly it did, it would 'hop, skip and jump,' I quickly placed a phial over it, and corked it safely. I then saw that its left antenna was broken.

"On reaching home I killed my twelve common species, and then *Mymar*, in the *thirteenth* phial. Proceeding to set it out, I found the battledore wings in a tangle, and endeavoured to brush them out; a small piece of 'fluff' kept getting in the way, so placing the fly under my microscope to see which way I could best remove the 'fluff,' I focussed it, and for some moments I could not believe my own eyes, for instead of 'fluff' it was the posterior wing three times the length of an ordinary one of *Mymar pulchellus*, and I began to realise that I had before me a new species—for not only were the posterior wings greatly elongated into a very narrow battledore with six long hairs on the lower margin, but the anterior wings were surrounded with *sixty* long hairs—instead of the thirty-five of *Mymar pulchellus*. In other respects the colour was much the same.

"As soon as I could, I made a photomicrograph of it of thirty diameters magnification.

"Considering the importance of this addition to the little-known British *Mymaridae*, I felt that it had appeared at a very opportune time, when so many distinguished visitors had come for the Coronation of His Most Gracious Majesty King George V, so I suggested to Mr. Waterhouse that we should christen it *Mymar regalis*."

Mr. C. O. Waterhouse commented on the extreme interest of this discovery, remarking that the *Mymaridae* have very small hindwings, in *Mymar* they are reduced to a mere bristle;

the gap between this and *Stephanodes*, for example, which is very great, is partially bridged by Mr. Enock's discovery, and possibly other links may be found in the future.

African Charaxes.—Mr. H. Rowland-Brown exhibited some drawers of Miss Fountaine's bred series of African *Charaxes*. Professor Poulton commented on these, regretting that the parent had not been preserved with the corresponding offspring in each case.

A Pompilid Mimicked by a Reduviid Bug.—Dr. Chapman exhibited a box of insects to illustrate a case of mimicry, on which he read the following note :—

"In March and April, both at Hyères and at Amélie-les-Bains, my attention was attracted to a Reduviid bug, *Pirates hybridus*, Scop. I followed up one or two on the wing, taking them for Pompilid Hymenoptera, and when they settled on the ground their movements were precisely those of *Pompilus* when hunting on the ground—sharp, active, jerky, and taking wing at once if alarmed. The red colouring on the elytra was, when running, much like the red of a Pompilid body between or under the wings. After the first one or two specimens one of course easily distinguished the bug for what it was.

"One would, at first, take this for a case of Batesian mimicry, but on picking up the bug, it often occurred that one was stung, about as sharply as many Pompilids do, and some are fairly proficient therein. The sting was of course the thrust of the beak or proboscis, of which not a few Reduviid bugs can make effective weapons of defence. The sting not only enhances the resemblance to an Aculeate, but gives a thoroughly Müllerian aspect to the association.

"There are very many bugs of similar form and brilliant coloration, *Pyrrhocoris*, etc. These are mostly slow-moving and harmless, and have, I imagine, no connection with the species under notice, but are probably cases of warning coloration of distasteful morsels.

"In the Cambridge Nat. History, Dr. Sharp quotes Seitz as recording a Reduviid at Corcovado in Brazil that exactly resembles a wasp of the genus *Pepsis*, and moves in the same wasp-like manner, and Prof. Poulton tells me of a British

Reduviid observed by Mr. Hamm, with precisely the same mimicry."

An Unexplained Association.—Dr. Chapman also read the following note on a nest of *Polistes gallica* :—

"At Hyères, on March 29th, 1911, at 10.30 a.m., with a gale from the east (Sirocco), sky overcast and a few drops of rain ; I found, on turning over a stone, under its edge a small nest of *Polistes gallica*. The nest consisted of eight small cells, in each of five of which was one egg. It could not have been founded very long. Under it (above it before the stone was turned over) there rested not one ♀ but two ♀♀ side by side. The advancement of the nest showed that it was impossible for one of these to be a worker reared in the nest.

"Were they working together, or was one only a casual visitor, taking shelter during the inclement weather? In the latter case would it not have been regarded and treated as an enemy, instead of both resting together in a thoroughly friendly way?"

Living Larvae of Callophrys avis.—Dr. Chapman also exhibited some well-grown larvae of *Callophrys avis* from the Riviera.

Hemipterous Mimics of Hymenoptera.—Prof. Poulton exhibited on behalf of Mr. A. H. Hamm, assistant in the Hope Dept. of the Oxford University Museum, a case of insects illustrative of certain associations of mimetic British Hemiptera-Heteroptera with their Hymenopterous models, and communicated the following paper from him :—

"The examples of mimicry mentioned below may be well known to entomologists : certainly the ant-like appearance of *Nabis* has been often described. My chief object is to record the fact that the Hemiptera are to be found in the localities frequented by their models, and often in their company. Field observations are especially important in the mimics of insects, such as the Hymenoptera Aculeata, with extremely characteristic habits and movements.

"*Alydus calcaratus*, L.—During one of my visits to S. Devon (August, 1899), I was collecting Aculeates on and about the heather at Bovey Tracey, and took what I thought was a Pompilid. On looking into the net I was surprised to

see nothing but an ordinary-looking, although very active, Coreid bug. While still watching it running about the net, the bug opened its wings to take flight, and exposed the bright red patch which covers two-thirds of the abdomen. The resemblance which had at first deceived me is not, however, solely due to the colouring; for the short, jerky flight and manner of running in and about the herbage, so characteristic of the Pompilidae, is also a marked feature in the movements of *A. calcaratus*. The bug is also to be found in the localities haunted by the *Pompilidae*. Within a few yards of the spot where I netted the above specimen and on the same day (Aug. 10th, 1899), I captured a ♀ *Pompilus viaticus*, L. Again, in the New Forest, on Aug. 14th, 1908, I captured an example of *A. calcaratus* and *Salius exaltatus*, F. ♀ in close proximity. On many other occasions, but always in sandy, heathy localities, I have seen this Coreid mimic, and its Pompilid-like movements and appearance have invariably attracted my attention.

"The observations recorded above refer to the mature insect: I now propose to speak of the earlier stages. On a sand-bank just outside Beaulieu Road Station, in the New Forest, I observed (Aug. 10th, 1908) what I at first mistook for *Formica rufa*, L. Knowing, however, that the ant is not found in this spot my curiosity was aroused, and looking more closely I saw that the insect was an immature bug. Within a short distance several other examples were found. These Mr. E. A. Butler has kindly determined for me as very young specimens of *A. alcaratus*, L. In this stage the bugs are remarkably ant-like, resembling most closely the common *F. rufa*, although at Beaulieu they were running about in company with *Formica fusca*, Latr., race *fusco-rufibarbis*. This latter ant, which was very abundant, itself somewhat resembles a small dark *F. rufa*. On Aug. 14th I found another immature *Alydus* in the same spot under precisely similar conditions.

"We thus see that the same species of bug, in two different phases of its life-history, mimics forms belonging to two widely-separated families of the Hymenoptera.

"*Pilophorus*, sp.—I have also had various opportunities of observing two other species of Heteroptera which are remark-

ably ant-like in their earlier stages. During the year 1900, when I was living in St. Mary's Road, Oxford, there was in the garden a rather old, diseased apple-tree, badly infested with cotton-blight, Sesiids, Aphides, etc. Ants of the species *Lasius niger*, L., were always journeying up and down the trunk, and in their company were many individuals of an immature Capsid bug, which Mr. E. A. Butler identifies as a species of *Pilophorus*, probably *P. cinnamopterus*, Kb. At this stage the bugs were remarkably ant-like, and there can be little doubt that this mimetic resemblance as well as the companionship of the ants is advantageous to them.

"*Nabis lativentris*, Boh.—At Wellington College, Berks, on Aug. 10th, 1907, I found an immature example of the Reduviid bug, *Nabis lativentris*, Boh., actually in the ant-run and in company with *Lasius fuliginosus*, Latr. Again at Bembridge, Isle of Wight, on July 8th, 1909, another immature specimen of the same species was found in company with *Lasius niger*. It is well known that these immature bugs possess a large, whitish patch on each side of the first abdominal segment, obliterating its breadth and giving it the appearance of a narrow, ant-like waist. This species, like the preceding, no doubt derives benefit from its close resemblance to ants and association with them.

"I wish to thank Mr. E. A. Butler for kindly determining this species for me. The examples now exhibited I have given to the Hope Department, where they will be accessible to all students of insects."

Mr. Donisthorpe observed that he had already made and published the same observations on the same species, with the exception of the Pompilid, and that it was very interesting that Mr. Hamm should have independently recorded the same circumstances. The President observed that in countries which might be called the headquarters of the Pompilids, and where they were divided into three groups, so far as colouring is concerned, *viz.* black, yellow and black, and red and black, he had frequently noticed that each group was accompanied by other insects of various orders, of the same coloration in each case. He suggested that the question of mimicry involved in the cases under discussion has a much wider scope than any to which British insects alone can supply an answer.

Family containing a new Female form, leighi, bred from a trophonius, Westw., Female of Papilio dardanus cenea, Stoll, from Pinetown, Natal.

Prof. Poulton exhibited the *trophonius* parent and the fifty-five offspring reared from her eggs by Mr. G. F. Leigh, F.E.S, of Durban. This very interesting family had been accompanied by the following notes written by Mr. Leigh :—

"*Durban*,
"*Sept.* 24*th*, 1910.

"I should have sent you this brood of *cenea* last mail, but I was away from Durban. I feel certain you will be very pleased with it, as it is certainly the most extraordinary lot I have ever reared from ova, and includes all three forms of the ♀ and also two specimens of another very fine variety. I am sending all to you, including these two varieties. This brood has taken up a great deal of time, and I have bestowed the greatest care upon them all through—about eleven weeks in all. I think the result will prove this, as I have only had seven deaths, and only one real cripple in the whole lot.

"As usual when breeding a number of specimens there is a greater proportion of females. There were great differences in the duration of the larval stage, some individuals feeding up very quickly, and others slowly, and also taking longer to change their skin and to pupate. I am certain that this also happens in wild larvae. The duration of the pupal state, however, varied very little. The first eight specimens bred took as nearly as possible two months from ovum to imago. At this time of the year I am sure the complete cycle would not exceed six weeks, but the parent of this brood was captured in our mid-winter (dry season), and consequently the food-plant was very dried up until the rains of about the last four days. This, in my opinion, accounts for the fact that the larvae did not feed so freely as they would have done at this time of the year.

"I think this is a very interesting brood, and the results undoubtedly show that the *hippocoon* form is the rarest of the three female forms here, and this is really as it ought to be, for *Amauris dominicanus* which it mimics is very scarce now.

Quite independently of this family, all collectors here now find the *hippocoon* form is getting rarer in the wild state, while *trophonius* is not so scarce. The very fine varieties, Nos. 36 and 48, with a pattern including elements from all the three other forms must now certainly rank as another distinct female form, for I have bred two others this year. One of these is in the Transvaal Government Museum, Pretoria, and the other Mr. A. D. Millar received in exchange. Mr. Millar also captured a damaged specimen in his own grounds, and another has been taken by Mr. Haygarth.

"Most of the females in this lot seem to me to be rather browner than usual on the underside. You will notice that two of the *trophonius* forms resemble the parent in possessing the brown suffusion of the white subapical bar of the fore-wing.* One *cenea* is a nice variety with one of the spots on the fore-wing brown instead of white.† All the specimens, with two or three exceptions, are larger than any I have bred from ova before, owing no doubt to the larvae being sleeved in the early stages on the living food-plant. I shall always adopt this method in future. The parent of this family was captured at Pinetown, Natal, and it is interesting that the two specimens similar to Nos. 36 and 48 that I bred early in the year, were also reared from Pinetown larvae.

"G. F. Leigh."

Later in the year 1910 Mr. Leigh succeeded in breeding two more examples of the new *leighi* form of female, as stated in the following extracts from letters received from him :—

"*Durban*,
"*Nov. 26th*, 1910.

"I have bred one more of the fine variety of *P. cenea* ♀ similar to the two sent you. This one, curiously enough, is also from the ova of a *trophonius* ♀, so all five here bred are from that form of parent.

"I have bred in all about 250 *P. dardanus cenea* from different parents: obtaining only 8 *hippocoon* form of the ♀, about 14 *trophonius* and 120 *cenea*, the others being males."

* Careful examination of the set specimens reveals this character in all the four *trophonius* offspring, see p. xxxviii.—E. B. P.

† This character is also present in other specimens, see pp. xxxvii, xxxviii.—E. B. P.

"*Durban,*
"*Dec.* 10*th*, 1910.

"This form seems now likely to establish itself in this part of the country, as I have bred another one from a wild larva found at Sydenham, about three miles from here. It was a very large, splendid specimen.

"G. F. Leigh."

The female parent of the family exhibited was captured by Mr. Leigh on June 26, 1910, at Pinetown, Natal (about 1000 ft.). She laid sixty-two eggs on June 27th–28th. The parent is a typical *trophonius* with a slight fulvous suffusion in the costal section and also along vein 5 of the subapical bar of the fore-wing, and without an apical spot. The spot within the fore-wing cell is divided, the detached outer end being greyish and obscurely defined. The large costal part of the marking is rather broad and short, in the form of an isosceles triangle with its base towards the costa. Hereditary influence is clearly manifest among the offspring, in the frequency with which the spot is divided, and less frequently in the appearance of the detached end and the form of the costal section.

The offspring, consisting of 25 males, 22 *cenea* females, 4 *trophonius* females, 2 *hippocoon* females, and 2 *leighi* females, emerged in the order and pupated on the dates shown in the following table:—

Offspring of *trophonius* female of *Papilio dardanus cenea* captured June 26, 1910, at Pinetown, Natal.

No.	Date of Pupation (1910).	Date of Emergence (1910).	Sex and ♀ form.
1	August 13	August 26	*Cenea* ♀
2	,, 14	,, 26	*Cenea* ♀
3	,, 14	,, 27	Male
4	,, 15	,, 27	Male
5	,, 15	,, 28	Male
6	,, 16	,, 28	*Cenea* ♀
7	,, 16	,, 28	Male
8	,, 17	,, 28	Male
9	,, 15	,, 29	*Cenea* ♀

No.	Date of Pupation (1910).	Date of Emergence (1910).	Sex and ♀ form.
10	August 16	August 29	*Cenea* ♀
11	,, 16	,, 30	*Trophonius* ♀
12	,, 17	,, 30	Male
13	,, 17	,, 30	*Hippocoon* ♀
14	,, 17	,, 30	*Cenea* ♀
15	,, 18	,, 30	*Cenea* ♀
16	,, 19	,, 31	*Hippocoon* ♀
17	,, 19	September 1	*Cenea* ♀
18	,, 20	,, 2	Male
19	,, 20	,, 2	*Trophonius* ♀
20	,, 20	,, 3	Male
21	,, 21	,, 4	Male
22	,, 21	,, 4	*Cenea* ♀
23	,, 21	,, 4	*Cenea* ♀
24	,, 22	,, 4	Male
25	,, 22	,, 4	*Cenea* ♀
26	,, 23	,, 5	Male
27	,, 23	,, 5	*Cenea* ♀
28	,, 24	,, 5	Male
29	,, 24	,, 5	Male
30	,, 24	,, 6	Male
31	,, 24	,, 6	Male
32	,, 24	,, 6	Male
33	,, 24	,, 6	*Trophonius* ♀
34	,, 24	,, 6	*Trophonius* ♀
35	,, 25	,, 6	Male
36	,, 25	,, 6	*Leighi* ♀
37	,, 26	,, 7	Male
38	,, 26	,, 7	Male
39	,, 26	,, 7	Male
40	,, 26	,, 7	*Cenea* ♀
41	,, 26	,, 7	*Cenea* ♀
42	,, 26	,, 7	*Cenea* ♀
43	,, 27	,, 7	Male
44	,, 27	,, 7	Male
45	,, 25	,, 8	*Cenea* ♀
46	,, 26	,, 8	Male
47	,, 26	,, 8	*Cenea* ♀
48	,, 26	,, 8	*Leighi* ♀
49	,, 27	,, 8	Male
50	,, 27	,, 8	Male
51	,, 27	,, 8	*Cenea* ♀
52	,, 27	,, 8	*Cenea* ♀
53	,, 27	,, 8	*Cenea* ♀
54	,, 27	,, 8	*Cenea* ♀
55	,, 27	,, 8	*Cenea* ♀

The proportion of the female forms in this very interesting family most nearly approaches that of Family 4, bred in 1906 from a *hippocoon* parent (Trans. Ent. Soc., 1908, p. 429). The present family contains, however, nearly three times as many

cenea (22 to 8), and, above all, the two remarkable *leighi* forms. In the numbers of *trophonius*, 4 as against 3, and of *hippocoon*, 2 as against 3, there is a close resemblance between the two families.

The 25 male offspring exhibit the transition usually found in Natal between a somewhat heavily marked submarginal band to the hind-wing and one in which the costal and inner gaps are clearly indicated. The series is a normal one with nothing remarkable about either of the extremes.

Several of the *cenea* offspring exhibit the influence of the *trophonius* parent in the richer deeper tinge of the basal patch of the hind-wing—an effect which is particularly distinct in Nos. 17, 6, 14, 1, 45, and 53, increasing in the order of these numbers. A similar influence of the *trophonius* parent upon the *cenea* offspring was observed in 1906 (Trans. Ent. Soc., Plate XVII, fig. 8, and Description, p. 313) and of *hippocoon* upon *cenea* in 1908 (Trans. Ent. Soc., p. 436). This parental influence upon the tint of offspring belonging to a different form is extremely interesting, especially when, as in most cases, no other visible effect is produced.

In describing the spots of the fore-wing the terminology suggested in Trans. Ent. Soc., 1908, p. 433, is followed. The submarginal spots (α) (β) and (γ) are normal in 15 specimens. (α) is so minute as to be nearly invisible in 23 and 41: it is wanting and (β) minute in 40 and 47: both are wanting and (γ) minute in 1 and 54. The missing spots are present on the under surface of all these specimens. The apical spot (δ) is wanting from both surfaces of 1, 45, and 53.

All the spots of the fore-wing upper surface are white in 6, 15, 23, and 47, and in 17, 22, 27, and 42 except for a faint yellowish tinge of the inner marginal border of the principal spot (1). In speaking of "spots" I do not include the streak along the inner margin (in 15, 27, 42, 51, 55, and minute traces in a few others), or the extension downwards and outwards from spot (1) into interspace 1*b* (in 23, 27, 41, the right side of 15, and slight indications in several others). The above-mentioned markings where present in this family are invariably ochreous. (1) is darkest

ochreous in 1 and 9 in which the other spots are pale yellowish, the tint being most distinct in spot (3). In the 12 remaining specimens (1) is pale yellowish and the other spots white except (3) and more rarely (5) which in some specimens are *very faintly* tinged with yellow.

Spot (2*a*) between (2) and (3) is present and of large size in 15, 23, and 42, minute in 6, 17, 27, 25 and 45, minute and only on the left side of 41. It is present on the under surface of all these and a few others. A new spot (3*a*) not hitherto described is placed in the angle between veins 7 and 8, where they diverge from each other, in 9 and 45. A minute spot (4*a*) is present in a single specimen 52.

Spot (5) within the cell is divided into two in the usual manner in about half the specimens of *cenea*: it is small in a few and minute in 54.

The 22 *cenea* offspring are thus a very interesting set, tending on the whole, as in Natal specimens generally, to resemble the *Amauris albimaculata* and the white-spotted forms of *A. echeria*. The appearance of the same peculiarity, such as the division of spot (5) in many individuals supports the evidence brought forward in 1908 (Trans. Ent. Soc., pp. 443–5) that modifications of minute elements in the pattern are certainly hereditary.

Of the 2 *hippocoon* offspring, No 16 possesses the apical spot (8) of the fore-wing, while No. 13 resembles the parent in being without it. Spot (5) in both resembles the parent, but not so completely as that of the 4 *trophonius*.

Of the 4 *trophonius* offspring, two, Nos. 33 and 34, possess the apical spot, while Nos. 11 and 19 are without it. All four exhibit the faint fulvous suffusion of the costal section of the subapical bar—a condition more strongly developed in No. 33 than in the parent.

Papilio dardanus, new female form *leighi*.

There can be no doubt that this variety, bred in Natal by Mr. Leigh six times in 1910 and also captured twice in Natal, possesses sufficient stability to rank as one of the female forms of *dardanus*. I therefore propose to name it the *leighi* form in honour of the naturalist who was the first to breed *P. dardanus*,

the most interesting of butterflies, from known parents. Further convincing evidence of its stability as a form is seen in the fact that it also occurs almost unchanged so far away from Natal as the N.E. corner of the Victoria Nyanza. A specimen collected by Mr. A. H. Harrison about 1903 at "Unyori," N.E. of Kisumu, differs from the Natal specimens no more than the other female forms of *P. dardanus* from these two remote localities are known to differ. "Unyori," as Mr. C. A. Wiggins informs me, is certainly a rendering of "Nyangori," a forested locality at a height of about 5000 ft. to the N.E. of the great lake. Mr. Harrison's specimen was figured $\frac{7}{8}$ of the natural size, by the present writer in Trans. Ent. Soc., 1906, Plate XX, fig. 1. It is there spoken of as "intermediate between *planemoides* and *cenea*." The figure here referred to may stand as an adequate representation of the *leighi* form described below, the slight differences between it and the Natal specimens, as also between the two latter, being indicated in the description.

Fore-wing upper surface. All the markings possess a rich fulvous tint closely resembling that of *planemoides*, becoming paler in closest proximity to the costa in the two Natal specimens. The three paler markings are: spot (4), between veins 8 and 9, the costal end of spot 5, within the cell, and the apical spot (δ), between veins 7 and 8. This increasing paleness towards the costa is also often seen in *planemoides*. In form and position the subapical bar is that of *trophonius* and *hippocoon*, while the other markings are those of *cenea*. In this latter form, the principal spot (between veins 2 and 3) may be extended downwards and outwards into the next interspace between veins 2 and 1), as may be seen in the examples represented on Plate XXVI, figs. 18, 19, and 21, of Trans. Ent. Soc., 1908. In the *leighi* form the same tendency is manifested to an equal extent in specimen 48, to a slightly greater extent in 36. The latter furthermore possesses the linear marking along the inner margin which is also often seen in *cenea*; e.g. in the original of Fig. 18 referred to above. In the Unyori (Nyangori) example (Plate XX, fig. 1, Trans. Ent. Soc., 1906) the principal spot extends downwards much further and is continuous with the linear

marking. In this latter example the subapical bar is also more fully developed and a faint extension of it intrudes into the space between veins 3 and 4 and a still fainter extension between 3 and 2, thus tending to bridge over the interval between the bar and the principal spot. The Unyori specimen in fact differs from the two Natal specimens in its slightly nearer approach to the pattern of *planemoides*.

Hind-wing upper surface. The submarginal spots, resembling those of *planemoides*, are fulvous, becoming pale towards the costal end of the series. The paleness begins in the pair of spots in interspace 5, while those in 6 and 7 are nearly white. This increasing paleness is far less marked in the Unyori specimen. In form and size the great basal patch resembles that of *cenea* and is somewhat smaller than in *planemoides*. In 48 it is sharply demarcated from the black ground-colour, while in 36 a more gradual transition is afforded by a sprinkling of dark scales. The latter condition exists in the Unyori specimen, and both are common in *cenea*. The colour of the patch in 48 and in the Unyori example resembles that of a rather deeply-tinted *cenea*, the Unyori example differing, however, in its duller shade. The patch of 36 exhibits an approach to the whiteness of *planemoides* in its pale yellow tint, which contrasts sharply with the rich colour of the other markings.

Both Natal specimens possess the intense black ground-colour and comparatively short fore-wings of the Natal *cenea*, while the Unyori specimen possesses slightly longer fore-wings and the duller fuscous tint of *planemoides*.

The under surface of both wings. The pattern of the under surface closely resembles that of the upper, as in both *cenea* and *planemoides*. The chief difference, in both these forms, is due to the duller, browner shade of the black ground-colour of the parts exposed in the resting position. Many of the markings also tend to spread and to become less sharply demarcated. The general effect of these changes in background and markings is that the whole of the exposed pattern looks obscure and dull as compared with the upper surface. There is a clear indication of the "costal gap" (Trans. Ent. Soc., 1904, p. 683) on the under surface of 36, the pale colour

of the basal patch streaming outwards in the 5th interspace (between veins 5 and 6). This feature, also commonly found in *cenea*, *planemoides* and other forms, is very faintly indicated in 48, and barely visible in the Unyori example.

I select as the type specimen 48 in the Hope Department, Oxford University Museum, choosing it rather than 36, because of the deeper tint of the hind-wing patch. This tint is also found in the Unyori specimen, and is probably more typical of the *leighi* form than the much paler shade of 36.

In addition to the individual differences between these three specimens described above it may be added that the spot in the cell is undivided in 36, but divided in the other two, the detached extremity being nearly obsolete in the Unyori (Nyangori) example. The submarginal spot (*a*) is wanting from 48 (although present on the under surface), but not from either of the other specimens. The apical spot (*δ*) is well developed in all.

The *planemoides* form is entirely unknown in Natal, and indeed in areas far to the north of it, and hence it is impossible to adopt the plausible interpretation of *leighi* as a hybrid between *cenea* and a male bearing the *planemoides* tendency, or *vice versa*. We are therefore driven to the hypothesis that the *leighi* form is a persistent definite stage in the evolution of *planemoides*.

My friend Mr. Roland Trimen, F.R.S., has kindly sent me (August 14, 1911) the following account of three specimens in his collection which possess the *leighi* pattern, but differ in the uniform ochreous tint of all the markings :—

"As regards the curious form of ♀ *P. dardanus* you write about, which Leigh has sent from Natal, and which you say is really the same as the one you figured in Trans. Ent. Soc., 1906, Pl. XX, f. 1, from N.E. of Victoria Nyanza, I have been looking up my lot of the S. African sub-species, and find 3 examples which approximate your fig. 1. The first and second of these you will find noted in my "S. Afr. Butt.," iii, p. 249 (under "B.h." in the text), and treated there as linking *hippocoon* and *trophonius*; the St. Lucia Bay example was taken by Col. H. Tower in 1867, and the Delagoa Bay one by Mrs. Monteiro in 1883. The third was captured at Morakwen.

Delagoa Bay, by Rev. H. Junod, 22nd January, 1891. In all three the inner-marginal fore-wing patch and the hind-wing patch are larger than in your fig. 1, but vary in size. All the markings in all three are rather strongly tinged with dull ochreous-yellow. Your fig. 1 is not coloured, but you give some account of the colouring in the "Explanation" and at pp. 293–4, from which I gather that the tint of the fore-wing (but not that of the hind-wing) markings is much deeper and richer, and more like that shown by *planemoides*, than any one of my three ♀ ♀ exhibits. In my specimens *all* the markings are of about the same pale 'buff' tint, with only a slight inclination to a rufous tinge.

"I can quite imagine a tendency of *planemoides* to crop up occasionally in the progeny of the S. African sub-species, notwithstanding the remoteness of the equatorial model. Indeed, something of this kind is noticeable in Cape Colony, where the *hippocoon* form is occasionally met with as far as *P. cenea* extends, although its model *Amauris dominicanus* is wholly absent."

An East African variety of the female *dardanus*, described and figured by Aurivillius as *mixtus* (Arch. f. Zool. Bd. 3, No. 23 (1907), T. 2, f. 2), presents many points of resemblance to *leighi*, but is intermediate between this form and the East African *planemoides* described below. *Mixtus* differs from *leighi* and approaches the example of *planemoides* in the greater development of the fulvous marking along the inner margin of the fore-wing, in the greater length and size of spot 5 (within the cell), and in the whiteness and the much greater size of the hind-wing patch. *Mixtus* also apparently differs in the far paler tint of the fulvous markings.

In such a protean species as *dardanus* I do not think it is convenient to give separate names to all the single varieties and transitional specimens, but in *leighi* we have a form that is not only distinguishable but possessed of sufficient stability to appear again and again over a very wide area. Furthermore, it is the only *planemoides*-like form known in Natal.

Papilio dardanus, Brown, Female form planemoides, Trim., from the Coast of British East Africa.—Prof. Poulton also exhibited an example of the *planemoides* female

captured in August 1910, in forest country (less, and probably much less, than 100 ft. elevation) between Jilore and Malindi. Jilore is about 70 miles N. of Rabai and 19 W. of Malindi. The specimen, which was kindly presented to the Hope Department by the Rev. K. St. Aubyn Rogers, M.A., F.E.S., had been taken by a native collector. The pattern of the fore-wing closely resembles that of the specimen collected by Mr. A. Harrison at Nyangori about 1903, and represented on Plate XX, fig. 3, of Trans. Ent. Soc. for 1906. It is there described as intermediate "between *planemoides* and *hippocoon*." The exhibited specimen differs from the figure in its approach to the pattern of *leighi*, the spot within the cell (undivided) being widely separated from the subapical bar and the latter only connected with the greatly enlarged principal spot (1) by scattered fulvous scales between veins 3 and 4. Below vein 3 the pattern almost precisely reproduces the appearance represented in Fig. 3, above referred to, the *hippocoon*- and *trophonius*-like extension of the pale pattern along the inner margin towards the base of the wing being slightly more evident in the coast specimen. The hind-wing is also *hippocoon*-like in the great size of the white patch, which is far larger than in normal specimens of *planemoides*.

The occurrence of *planemoides* on the E. coast, so far from its *Planema* models, is of high interest, as also is the fact that this, the only specimen hitherto recorded from the area in question, should not be a typical example but one exhibiting several ancestral features.

The specimen may be compared with another very interesting example, captured Sept. 22, 1901, in forest country about ten miles inland from Mombasa, near Changamwe, by Mr. C. A. Wiggins, F.E.S. While the pattern is almost precisely as in the exhibited specimen, the colouring is that of *trophonius*, or rather of its modification *niobe*, Auriv.; for the subapical bar of the fore-wing is fulvous like the other markings. The specimen also lacks the scattered scales connecting the bar with spot (1). The increasing lightness of the markings towards the costa of the fore-wing, spoken of on p. xxxix, is well marked. Except for this change the fulvous colouring is of a uniform pale shade like that of the

trophonius (and *niobe*) of *P. dardanus tibullus* and *dardanus dardanus*—a shade very different from the richer, deeper fulvous of *planemoides*.

Heredity in the Female Forms of Hypolimnas misippus. —Professor Poulton exhibited a series of thirty-five females of the type form, together with their female parent, of the *inaria* form, captured Aug. 15, 1910, by Rev. K. St. Aubyn Rogers, M.A., F.E.S., at Rabai, near Mombasa. The males were liberated and the females emerged from the pupa on the following dates:—

Sept. 15, 1910—sixteen, 4 with a slight, 2 with a rather more pronounced white patch on the hind-wing; Sept. 16—nine, 1 with slight, 2 with more pronounced white patch; Sept. 17—eight, 5 with slight indication of the patch; Sept. 18—two, 1 with slight indication of patch.

The female parent is a typical *inaria*, with no indication of the white patch on its hind-wing. The female offspring were all typical *misippus*.

This result compares in a most interesting manner with those obtained on two other occasions. The first of these is the family of fifty *inaria* females bred in 1908 by Mr. Rogers from an intermediate female parent, also from Rabai (Proc. Ent. Soc., 1909, pp. xxxvi, xxxvii). This latter parent was "intermediate between the type and the *inaria* form, but on the whole nearer the former . . . the whole of the female offspring were *inaria*—not a single type form, not a single intermediate." The second is the family bred in 1904 by Mr. G. F. Leigh, F.E.S., from an intermediate female captured in the Durban district. Of the eight female offspring four were typical *misippus*, three typical *inaria*, and one intermediate (Trans. Ent. Soc., 1904, pp. 689, 690, Plate XXXII).

Thus there have been bred from *inaria* or intermediate females, first, equality of *inaria* (including intermediate) and *misippus*; secondly, *inaria* alone; thirdly, *misippus* alone. These results are consistent with the Mendelian relationship, if we assume (1) that the intermediate female behaves in heredity like *inaria*, (2) that *misippus* is dominant over *inaria*, (3) that the first male parent was a heterozygote, the second carried the tendency of *inaria*, the third that of *misippus*.

Euralia anthedon, Doubl., and E. dubia, Beauv., proved by breeding to be the forms of a single species.—Prof. Poulton exhibited a female parent of the *dubia* form captured on March 19, 1911, at Oni, 70 miles E. of Lagos, by Mr. W. A. Lamborn, together with a selection from the offspring reared from its ova. The offspring included both *dubia* and *anthedon*. Thus Mr. Lamborn had been able to verify the suggestion made in Trans. Ent. Soc., 1902, p. 492: "If Mr. Marshall's conclusion [advanced, on pp. 491–2, that the Eastern Euralias, *wahlbergi*, Wallgr., and *mima*, Trim., are the forms of a single species] be established, it follows that the corresponding and closely-allied mimetic West African forms *Euralia anthedon* and *E. dubia*, connected like *wahlbergi* and *mima* by intermediate varieties, are similarly the dimorphic forms of a single species." Mr. Marshall's conclusion concerning the Eastern species was confirmed by the late Mr. A. D. Millar in 1909 (Trans. Ent. Soc., 1910, p. 498), and the further prediction about the Western species is now, in 1911, verified by Mr. W. A. Lamborn. The Western problem is, however, the more complicated and interesting of the two; for *Euralia dubia* is not a simple mimetic form like *mima*, but is itself modified in the Oni district into three subordinate forms, in mimicry of (1) *Amauris egialea*, Cram., with much yellow in the hind-wings, (2) the most strongly white-marked of the local forms of *Amauris psyttalea*, Plötz, (3) *Amauris hecate*, Butl., and the darkest forms of *A. psyttalea* which closely resemble them. The hereditary influence of the parent *dubia* upon its *dubia* offspring was clearly evident in Mr. Lamborn's families.

[It may be added that Mr. Lamborn has now bred families from three *dubia* parents of various forms, and one from an *anthedon* parent, all captured at Oni in March of the present year. Both *anthedon* and *dubia* appeared in all the families. The numbers of the offspring are very large, and the two forms always bear a simple numerical relationship to each other, such as we should expect to see in a Mendelian pair. At the date of the meeting (June 7) only two of these families, both from *dubia* parents, had arrived in this country.—E. B. P., Aug. 7, 1911.]

Instances of Mimicry, Protective Resemblance, &c., from the Lagos District.—Mr. W. A. Lamborn, who was introduced by Prof. Poulton, had intended to show at this meeting the cases which he had exhibited at the Conversazione, but owing to a misunderstanding, they had not arrived. He made, however, the following observations :—

"Prof. Poulton's account of the mimicry of certain Danaine butterflies by Euralias induces me to mention that I recently took at one sweep of my net two butterflies, an *Amauris psyttalea*, Plötz, and a *Euralia dubia*, which were flying round and round each other in a manner suggestive of courtship. Their movements on the wing were so active that I was unable to recognise them before capture, and it seemed to me evident that the one must have been deceived by the mimetic resemblance to its own species exhibited by the other.

"In the exhibit which I had hoped to bring to your notice is a West African Hypsid moth determined by Prof. Poulton as *Deilemera*, probably *antinorii*, Oberth., with the cocoon from which it emerged. The cocoon bears a large number of creamy white semi-transparent frothy spheres which bear a very strong resemblance to the cocoons of Braconid parasites. The cocoon was formed during the night by a larva in my possession, and it bore these structures when I first saw it. Their resemblance to the cocoons of the parasites was so marked that I did not make a very careful examination, and I did not discover their spuriousness till the moth came out. Prof. Poulton has since pointed out that the structures are very loosely heaped up on the cocoon, and that they are also noticeable on the silky material in the immediate neighbourhood of the cocoon, facts which tend to suggest still more strongly that the structures are Braconid cocoons. They doubtless have a protective function. A bird, for instance, would soon learn that a cocoon bearing the Braconid cocoons does not contain a pupa worth eating, and it is reasonable to suppose that it would likewise pass by a cocoon bearing structures which resemble them in such a remarkable way.

"I have obtained some light on the relationship between the 'brands' or patches of peculiar scales on the wings of male *Danainae* and the double tuft of hairs which can be

protruded from the posterior extremity of the body. In January of this year I observed a male *Amauris niavius*, L., settle on the upper surface of a leaf with its wings expanded. The insect flexed its abdomen, making the dorsal surface convex, so that the extremity of the body was brought level with the brands, and the tufts were then thrust out. By alternately flexing and straightening out the abdomen the tufts were passed to and fro over the surface of the brands as though some secretion was being conveyed from the one to the other. Prof. Poulton has suggested that the greasy appearance of the brands may be probably interpreted on the hypothesis that they serve to retain and distribute a scent employed in courtship brought to them by the tufts."

Dr. Longstaff said that he was satisfied that in *Euploea* and *Danaida chrysippus* the characteristic scent was not caused by the tufts and brands, though these were very likely the cause of another volatile scent which certainly existed in these cases. Female Danaids have a scent as well as males; the scent common to both being nauseous, while that peculiar to the male is probably a help in courtship.

Prof. Poulton remarked that the brands actually are greasy, and not merely look so, and that they may for a time hold the scent transferred to them by the tufts.

Dr. Jordan observed that the discovery in Natal of intermediates between *cenea* and *planemoides*, which from previous experience had been supposed not to exist, made it impossible any longer to argue from their non-existence in favour of the sudden, as opposed to the gradual, evolution of dimorphic forms.

Paper.

Com. J. J. Walker read the following paper :—

"Some remarkable ant-friend *Lepidoptera* of Queensland." By F. P. Dodd, F.E.S., with Supplement by E. Meyrick, B.A., F.R.S.

Wednesday, October 4th, 1911.

The Rev. F. D. Morice, President, in the Chair.

Election of Fellow.

Mr. C. B. Williams, of 20, Slatey Road, Birkenhead, was elected a Fellow of the Society.

Votes of Condolence.

The decease was announced by the President of Dr. Samuel H. Scudder, of Cambridge, Mass., U.S.A., one of the oldest of the Honorary Fellows; of Mr. A. H. Clarke; of Mr. Albert Harrison, lately a member of the Council, and of Mr. G. H. Verrall, a former President of the Society.

The President, in a short speech, proposed a vote of condolence with the relatives of Mr. Verrall, which was seconded by Prof. Poulton.

A vote of condolence with the relatives of the late Mr. Albert Harrison was proposed by the Rev. G. Wheeler, and seconded by Mr. W. J. Kaye; and a similar vote in the case of Dr. Scudder was proposed by Mr. Champion, and seconded by Prof. Poulton, all the Fellows present signifying approval by rising.

Exhibitions.

Ants from Rannoch.—Mr. Donisthorpe exhibited specimens (♂♂ and ☿☿) of *Formica pratensis*, De G. (*congerens*, Nyl.), taken at Rannoch in June, also ☿☿ f *F. sanguinea* captured in the same region, a new locality for it; and ♀♀ and ☿☿ of a new race of *Formica rufa*, also from Rannoch. Mr. Donisthorpe said that the nest of the last-named was a small mound made of heather, etc., superficially like an *exsecta* nest, on a moor away from woods. The habits of the ants were different from those of *rufa*; the ♀♀ have long golden hairs on the scale and base of thorax and abdomen, and the scale more emarginate in the ☿☿.

Black Melanargia galathea.—Mr. Bethune-Baker exhibited a specimen of *Melanargia galathea*, var. *lugens*, taken at

Digne in July last. It is an entirely dark brown (almost black) form, with no white markings, though the ordinary markings are just traceable in a slightly lighter shade. He remarked that a similar specimen was described and figured in the *Bulletin de la Société lépidoptérologique de Genève* (vol. i., plate 6).

Commander Walker observed that a similar example had also occurred in England at Chattenden Roughs, Kent, in July 1872. This insect is figured in the "Entomologist," vol. vi., p. 57 (1873), and is now in the collection of Mr. A. B. Farn.

A Remarkable Oxytelus.—Mr. Norman H. Joy exhibited a remarkable specimen of *Oxytelus* taken at Tresco, Scilly Isles, April 1908. In many respects it is quite intermediate in character between *O. sculptus* and *O. laqueatus*, Marsh., having the large eyes of the former, and the sculpture of the neck and structure of the first joint of the antennae of the latter. The penultimate joints of the antennae are, however, different from either of these. It is probably a species new to science, but may possibly be a hybrid of these two species.

Species of Liodes.—Mr. Joy also showed *Liodes stenocoryphe*, Joy, ♂, taken by Mr. W. E. Sharp, at Forres, in 1910, as well as its near allies for comparison, the aedoeagus being shown in each case. He also exhibited *Liodes picea*, Ill., taken by Mr. Tomlin and Mr. Joy at Dalwhinnie, Inverness-shire, in September, when the larva was also found feeding on a small underground fungus; *L. dubia*, King, and its various varieties. The extremes of these varieties are very distinct-looking forms, yet if enough material is collected from various localities no constant specific characters can be found, as so many intermediate forms are met with. *L. algirica*, Rye, is almost certainly only another variety of this species.

Parthenogenesis in Lasius niger.—Mr. W. C. Crawley exhibited a mixed colony of *Lasius umbratus* and *L. niger*. This colony consists of a ♀ *L. umbratus*, which was accepted in 1908 by a queenless colony of *L. niger*. During 1909 and 1910 only *niger* ☿ ☿ came to maturity in the nest; those, therefore, that hatched in 1910 must have been from parthenogenetic eggs laid by the *niger* ☿ ☿. Over a dozen of these latter were dissected, and found to contain no *receptaculum seminis*.

In 1911 the ♀ ♀ of *umbratus* began to appear, and at present the yellow and black ants are in about equal numbers, and live together in complete amity.

Mr. Donisthorpe commented on the interest of Mr. Crawley's experience, remarking that while it had formerly been supposed that parthenogenetically laid ova produced only ♂ ♂, Mr. Crawley had shown, and proved by dissection, that ♀ ♀ were capable of parthenogenetically producing ♀ ♀.

The President observed that parthenogenesis was not unusual in sawflies, and mentioned that in one species, *Croesus varus*, Vill., which had been founded on a ♂ specimen, the original specimen was the only ♂ ever recorded, though the ♀ was a well-known insect, and had been reared through several generations in captivity, no ♂ ever making its appearance.

Dr. M. Burr remarked that the common "stick insect," *Bacillus rossi*, is largely parthenogenetic, and has been bred parthenogenetically for more than twelve consecutive generations. Mr. C. O. Waterhouse and others joined in the discussion.

Melanic Lithosia.—Mr. E. A. Cockayne exhibited a melanic specimen of *Lithosia deplana*, ♂, taken in Surrey last July.

Sicilian Rhopalocera.—Mr. J. Platt Barrett exhibited some species of Sicilian butterflies taken this year, in contrast with corresponding British species, which he described as cases of "painting the lily." The species contrasted were *Euchloë cardamines* and *E. damone*, *Gonepteryx rhamni* and *G. cleopatra*, *Hipparchia semele* and var. *algirica*. Small southern forms were also exhibited of *E. cardamines* and *Leptosia sinapis*.

Alpine Lycaenids.—Dr. Chapman exhibited living larvae of *Albulina pheretes*, and a living imago of *Latiorina orbitulus*, and read the following notes :—

"In my paper on *Latiorina orbitulus*, I suggested the probability that *Albulina* (*Lycaena*) *pheretes* had a larva without a honey gland, and that on this ground it was possibly related to *L. orbitulus* (Trans. 1911, p. 153). I have, during the past summer, succeeded in testing the truth of this hypothesis, by obtaining the hitherto unknown of larva of

A. pheretes. In the result it appears that the hypothesis was incorrect. The larva of *A. pheretes* possesses a honey gland and fans.

"To the warm weather during August and September it is probably owing that three of my larvae have reached the last instar, a result not often, I suspect, occurring in this species, a distinct effort to produce a second or autumnal brood; I am therefore able to exhibit the larva in the 3rd, 4th, and 5th (or last) instars. I hope to give a fuller account of the early stages in the near future. I may remark that *L. orbitulus* also afforded 'forward' larvae this season, and I exhibit a living butterfly of this autumnal emergence which left the pupa on October 2nd; but *Vaccinüina optilete*, without exception, stopped at the 3rd or hibernating instar."

In reply to a question whether he had seen ants in company with the larva of *A. pheretes*, Dr. Chapman replied that the larvae were bred from ova, so that he had not seen them in a wild state, but added that ants were abundant in the locality from which the ova came.

Two Tortricidae new to Science.—Mr. J. H. Durrant exhibited two new British species of *Rhyacionia* Hb. (= *Retinia* Gn.; *Evetria* Hb. Meyr.)

Rhyacionia purdeyi, sp. n., taken among Scotch firs at Folkestone at the end of July 1911, by Mr. W. Purdey, a very distinct species intermediate between *sylvestrana* Crt. and *duplana* Hb., easily distinguishable from the former by the ferruginous apex of the fore-wings and the slightly different direction of the fasciae, and from the latter by its more regular and distinct striation, as also by its brighter ferruginous coloration, which occupies a greater proportion of the wing-surface, especially towards the dorsum.

Rhyacionia logaea, sp. n., from Forres, Scotland (W. Salvage and H. McArthur), closely allied to *duplana* Hb. and *posticana* Ztst., but the much longer ciliations in the antennae of the ♂ will at once separate *logaea* from these species. *R. posticana* is a broader-winged insect than *duplana* and *logaea*, and the hind-wings are distinctly darker and less pointed. The type ♂ of this new species is the specimen figured as *duplana* by Barrett (*British Lepidoptera*, XI., pl. 476, fig. 2); the ♀ is

similar but smaller than the ♂, and somewhat more distinctly marked, it is, however, hardly so clearly and neatly fasciate as is the ♀ of *duplana* Hb., moreover the direction of the fasciae is not precisely similar, and the dark scaling along the tornus of the fore-wings is a good distinguishing character in *logaea*. Specimens doing duty as *duplana* and *posticana* in British collections should be carefully examined—these will probably be found to be mostly *logaea*. At present Mr. Durrant said he had only seen two specimens of *duplana*. These were purchased from Meek by Lord Walsingham, as British, in 1868, and it would certainly be satisfactory to examine others with a better record. These two specimens of *duplana*, Hb., ♂ and ♀, as also both sexes of *posticana*, were exhibited for comparison.

Coliads from Berkshire.—Mr. J. H. Durrant also exhibited eighteen specimens of *Colias* taken by himself in a field of lucerne at Barcote, near Faringdon, Berks, from September 4–10, 1892. These comprised both *hyale* (2) and *edusa* (14) and two aberrations of the latter, one of a very light orange colour (*ab. helicina*) and the other a fine ab. *helice*. All the specimens of *C. edusa* were of a yellowish-orange tint.

Sympetrum fonscolombii.—Mr. W. J. Lucas exhibited specimens of *Sympetrum fonscolombii*, and read the following note:—

"On August 4 last, at a pond in the south of the New Forest, I saw some dragonflies of the genus *Sympetrum*, very much more brilliant than the common *S. striolatum*. After some time I managed to capture one, and found it to be a male of *S. fonscolombii*, a species very seldom taken in Britain, and quite new to the Forest. It is a restless insect, which settles very frequently, but, nevertheless, is very difficult to capture. I visited the pond again on August 7, 8, 25 and 29, and as a consequence of the five visits obtained a short series, all but one being males. *S. fonscolombii* is usually considered to be a casual visitor only to our shores; but one or two things in this case seem rather to throw doubt on this supposition. For one thing the date is a late one, then the insects on my first visit to the pond were very fresh; again, one was a female, which looked even fresher than the males; further,

females seem seldom to join migratory swarms. Previous captures of the insect in Britain are: (1) One ♀ in Stephens' Cabinet in the British Museum, *supposed* to have been taken near London. (2) A ♂ taken in 1881 at Deal, now, I believe, in the Dover Museum. (3) Seventeen males taken by Mr. C. A. Briggs at Ockham Common, Surrey, in June 1892. (4) A ♀ taken in Cornwall, by Mr. Boyd, in June 1903. (5) Two males taken June 24, 1908, by Mr. E. R. Speyer, near Shenley, Herts, and one ♀ captured by him at Aldenham Reservoir, on July 29 of that year."

Separation of the Sexes in Hypolimnas misippus.—Dr. F. A. Dixey read a letter received by him from Mr. E. A. Agar, of Dominica, West Indies, on the subject of the Separation of the Sexes of *Hypolimnas misippus*, in which the writer remarked that in that island, although haunting similar localities, the ♀ remains on the coast while the ♂ is to be met with some distance inland. The former is scarcely ever to be seen in company with the ♂ of its own species, though it flies with *Danaida plexippus*, of which it is a mimic. Mr. Agar suggested that it looked as if "both sexes were aware that if they flew in close association it would give the show away," which implies intelligence of too high an order.

Dr. Dixey remarked that it was a common experience that one sex of a butterfly at any given time was more in evidence than the other. Of course, in such cases it was certain that the other sex must be somewhere. Mr. Millar, of Durban, had drawn his attention to the fact that, speaking generally, the males were more apt to be on the wing during the morning, and the females in the later hours of the day. Mr. A. R. Wallace mentions that the males and females of certain South American Pierines, of which the males are practically ordinary white butterflies and the females are Ithomiine mimics, have different habits and do not fly together. The females accompany their models in flight, which suggests the significance of the habit. The fact that some means of protection required the adoption of a corresponding habit to make them effective, of course did not carry with it any assumption of consciousness on the part of the insect of the

significance of its behaviour. The habit was of the nature of a reaction or response, which, like other adaptations, had grown up under the influence of natural selection.

Dr. Longstaff observed that in North Africa certain species of *Teracolus* gave abundance of ♂♂ in the morning, whilst in the afternoon the ♀♀ predominated greatly.

Commander Walker, Mr. G. A. K. Marshall and Prof. Poulton also took part in the discussion.

The Cocoon of Deilemera antinorii, Oberth.—Prof. Poulton exhibited the cocoon of the Hypsid moth *Deilemera antinorii*, Oberth., which Mr. W. A. Lamborn described (*see* p. xlvi), and had intended to exhibit on June 7 last. He stated that Mr. Lamborn had written on September 4, since his return to the Lagos district: "The larva passes the cocoon-like bodies through the anus, as you surmised." A little later, on September 10, Mr. Lamborn had written: "I cannot add more precise information as to the way in which the cocoons are formed, for the larvae which have hitherto spun up, did so at a time when I could not conveniently observe them. I saw, however, a few more of the Braconid-cocoon-like bodies passed *per anum* at the end of the cocoon opposite that at which the larva was spinning, and when several had accumulated the larva turned round and distributed them."

All-female Batches of Acraea encedon, L., bred in the Lagos District.—Prof. Poulton also exhibited examples from three of the all-female broods obtained by Mr. W. A. Lamborn, viz. from Companies 2 and 3 and from Family 1 in the table printed below. These three sets were chosen because they prove that the unisexual batches are not necessarily associated with either of the forms of *encedon* in the locality. Thus Family 1 was all *lycia*, Company 3 all *encedon*, while Company 2 was as nearly as possible half and half (23 to 24). The table clearly shows, in a condensed form, all the results hitherto obtained in this species by Mr. Lamborn. Out of the three families, one was all-female; out of the seven companies, three. Furthermore, the results obtained from the two sets of wild larvae strongly suggest that both were, in chief part, composed of the scattered individuals of an all-female batch, intermixed, in the June-July series, with an

earlier bisexual brood, in the December series with a later one.

1910	*Encedon*		*Lycia*		History
	♂	♀	♂	♀	
Company 1			46	32	From batch of eggs on single leaf
,, 2		24		23	,, ,, ,,
,, 3		35			,, ,, ,,
,, 4	6	2	4	1	,, ,, ,,
,, 5		6		16	,, ,, ,,
,, 6			3	3	,, ,, ,,
,, 7	2	1	7	6	,, ,, ,,
Family 1				48	From ♂ and ♀ *lycia* captured in cop.
,, 2			19	13	From ♂ and ♀ *lycia* of Company 4
,, 3	5	11	6	13	From a captured ♀ *encedon*
Wild Larvae	6	8	5	26	Emerged June 26–July 13, 1910. Only females appeared after July 7 : 3 *encedon* and 24 *lycia*
,, ,,		17	3	18	Emerged December 10–24, 1910. The 3 males appeared with 2 ♀ *lycia*, December 23–4

It is to be noted that the three all-female companies were bred from eggs laid normally in the wild state, and the conclusion is inevitable that a large proportion of such companies is the normal occurrence. On the other hand, the figures suggest that all-male companies are not normally produced. Males, however, were more numerous than females in all the bisexual batches except Company 6 and Family 3; and the males often emerged earlier than the females. The common occurrence of the unisexual companies obviously promotes interbreeding, and the advantages of interbreeding, acting as selective criteria, may have increased the tendency to produce nothing but females as soon as it appeared.

These results have been submitted to Mr. L. Doncaster, who agrees with Prof. Poulton in thinking it probable that the *lycia* form, although far commoner in the district, is recessive. Mr. Doncaster wrote, September 26 : "On the data available I am inclined to think *encedon* is dominant. The Family 2 from parents ex Company 4 is hardly explicable on any other view, and, as you say, the existence of several pure *lycia* broods

suggests it strongly. The arguments for the dominance of *lycia* appear to be the brood from Company 7 (but out of a total of sixteen it is not very unusual to get such departures from the expected 1 : 1 ratio), and the fact that *lycia* is the common form in the locality. This, however, is not of great weight."

Mr. Doncaster has suggested, and Prof. Poulton has forwarded to Mr. Lamborn the lines of future experiments, which it is hoped will throw more light on the Mendelian relationships, and, above all, on the unisexual broods of this interesting *Acraea*.

The Proof by Breeding that Acraea aurivillii, Staud., is the Female of A. alciope, Hew.—Prof. Poulton exhibited a series of eight *A. alciope* and five *A. aurivillii* bred in the present year by Dr. G. D. H. Carpenter from thirteen small larvae found on a single leaf of the food-plant on Damba Island, in the Victoria Nyanza to the east of Entebbe. The result entirely confirmed the conclusions of Mr. Eltringham and Dr. Jordan, as published in the Proceedings for November 17, 1909 (pp. lxvii–lxix).

Depredations by Minute Ants.—The Rev. G. Wheeler exhibited some living ♀♀ of a small ant, identified by Mr. Donisthorpe as *Monomorium pharaonis*, imported from Madeira, and now settled in England, together with several butterflies whose bodies and heads had been devoured by them while in the setting box. Mr. Wheeler observed that these insects had all been killed in the cyanide bottle, whilst others in the same setting box which had been injected with oxalic acid were left untouched. Mr. R. W. Lloyd remarked that there were two other small species of foreign ants which had also domiciled themselves in houses in England. Several Fellows joined in the discussion, Mr. C. J. Gahan observing that these ants were reported to be very destructive to the common bug, and were rather to be encouraged, whilst Commander Walker said that he had found them very destructive to his entomological specimens on board ship, but that on the only occasion when he had known of their occurrence in company with bed-bugs, the two had lived together in perfect amity. The Rev. G. Wheeler replied that when they infest

the larder there are obvious drawbacks to encouraging these ants, but that he had almost entirely got rid of them by painting all corners formed by walls, floor, ceiling or shelves with paraffin. Mr. Donisthorpe feared that the relief would be only temporary, since the ♀ ♀ generally live in the foundations.

Insects seeking High Ground.—The President said that about the beginning of July this year, he had noticed, while collecting near El Guerrah, the junction for Constantine, Biskra and Alger, both sexes of the yellow and black *Leucospis gigas*, and of another red and black *Leucospis*, flying in great numbers, with a loud humming noise, round a cairn of stones on the top of a hill, and suggested that the common instinct to seek high places might provide a meeting-ground for the sexes. He had been surprised to find these insects together in such numbers, as, being parasitic on different species, they would be likely to be separated.

Prof. Poulton referred to his communication "A possible explanation of insect swarms on mountain tops" (Proc. Ent. Soc. 1904, p. xxiv.), and suggested that the instinct referred to by the President would probably be especially useful in the case of parasitic insects whose hosts might naturally be separated, as some means of providing a meeting-place would be particularly necessary.

Papers.

Commander Walker read the following papers:—

(1) Report on a collection of *Bombyliinae* (Diptera) from Central Africa, with descriptions of new species, by Prof. Mario Bezzi, Turin, Italy (communicated by G. A. K. Marshall, F.E.S.).

(2) An enumeration of the *Rhynchota* collected during the Expedition of the British Ornithologists' Union to Central Dutch New Guinea. By W. L. Distant.

(3) *Oestridae Cavicolae*, by Ivan E. Middleton, F.E.S., of Serampore, India. The last is given *in extenso*.

"It is with a view to furthering investigation that I propose to devote a paper to this very interesting group of flies.

"They consist of six genera, each containing one or more known species, viz.—

1. The genus *Cephalomyia*, Macquart.
2. ,, *Oestrus*, Linné.
3. ,, *Rhinoestrus*, Brauer.
4. ,, *Pharyngobolus*, Brauer.
5. ,, *Pharyngomyia*, Schiner.
6. ,, *Cephenomyia*, Latreille.

"It may be instructive to deal briefly with the genera as classed above, mentioning the order of animals they utilise as hosts for their young, viz.: The *Cephalomyia*—1 species—is common to the *Bos bubalus* and *Camelidae*; the *Oestrus*—8 species—to the *Cavicornia*; the *Rhinoestrus*—2 species—to the *Equus caballus* and *Hippopotamidae*; the *Pharyngobolus*—1 species—to the *Proboscidea*; the *Pharyngomyia*—1 species—to the *Cervidae*; and the *Cephenomyia*—7 species—to the *Cervidae*.

"The flies belonging to the sub-family in which I am interested do not cause injury by biting animals, but cause great discomfort by depositing their eggs on the inner surface of the nostrils, from whence the larvae, in the case of the first three genera, find their way into the maxillary and frontal sinuses; in the fourth and fifth, into the pharynx; and the sixth, into the sub-lingual cavities; while it is interesting to note that the *female* flies invariably select *male* animals as the medium for the propagation of their kind. This process generally takes place in the spring, and it is not till the following winter that the fully developed larvae are ejected by the animals that harboured them. The larvae then creep away into holes and crevices, where they shrink and pupate; from whence the imago emerges to carry on again the cycle thus completed.

"I shall refrain from giving a detailed description of each genus as there is no dearth of literature on the subject, but pass on to a less well-known use to which the larvae are put. When travelling through Rajputana in the year 1903, my attention was drawn to a small trade carried on between the *hakims* (native physicians) and the camel-drivers, with the larvae from their animals. Inquiries led to the discovery

that the larvae were used by the *hakims* as a specific for epilepsy. This mode of treatment was not unknown to the ancients. It was mentioned from the tripod of Delphi that the larvae from the heads of goats were prescribed as a remedy for this disease; and on the authority of Alexander Trallien we are informed that Democrates consulted the oracle. This cure has been tried by me in several instances with fairly good results, and I believe that were it taken up and further experimented with, it would prove an inestimable boon to many sufferers from this terrible ailment."

Wednesday, October 18th, 1911.

The Rev. F. D. Morice, President, in the Chair.

Election of Fellows.

The following gentlemen were elected Fellows of the Society:—Mr. Sidney Howard Cotton, 1A, Chesterfield Street, Mayfair; Captain J. J. Jacobs, R.E., 2, Southport Street, Gibraltar; Mr. Kunui Khunan, M.A., Assistant Entomologist to the Government of Mysore, Bangalore, South India; Dr. Ivan Clarkson Maclean, M.D., B.Sc., M.R.C.S., L.R.C.P., 28, Hill Street, Knightsbridge, S.W.; Mr. Frank Taylor, The Technological Museum, Sydney, New South Wales.

Dates of Society's Publications.

The Secretary made an appeal to the Fellows for any MS. notes which they might possess throwing any light upon the exact dates of issue of the earlier Transactions and Proceedings, especially from 1840 to 1850, and 1868 to 1878 inclusive. The dates most urgently needed are those of the Proceedings from 1840 to 1846 inclusive.

Exhibitions.

Papilio (Tachyris) melania, Fabr.—Dr. F. A. Dixey exhibited a pair of each of the following species—*Tachyris melania*, Fabr., *T. celestina* and *Catophaga ega*, Boisd., and remarked upon them as follows:—

"*Papilio melania* was described by Fabricius in 1775, and figured by Donovan (Ins. N. Holl., 1805). Much doubt has prevailed as to the identification of Fabricius's species. Boisduval's *P. melania*, according to A. R. Wallace, is the female of *Catophaga ega*, Boisd. Wallace himself said, in 1867, 'The *Papilio melania* of Fabricius has not yet been properly identified, and probably never will be.' He was no doubt unaware that Fabricius's type was preserved in the Banksian Cabinet, where it may still be seen.

"In 1884, Miskin applied the name *T. melania* to the female of *Tachyris celestina*, Boisd. Until quite recently the British Museum possessed no specimens of Fabricius's insect, except the type (which was not included in the general Collection). The specimens that appeared in the Collection as *C. melania* were *Pieris* (*Catophaga*) *zoe* of Vollenhoven, the Batchian form of *C. jacquinotii*, Luc. Meanwhile, the true *P. melania* of Fabricius had been re-described by Miskin in 1888 as *Tachyris asteria*.

"Mr. G. A. Waterhouse has now sent home specimens which are undoubtedly of the species described by Fabricius and represented by Donovan. It is said by Mr. Waterhouse to be rare and no doubt very local. Four of these specimens are in the British Museum, and a pair, male and female, here exhibited, have been presented to the Hope Department. These were captured at Kuranda, near Cairns, in North Queensland. Fabricius's type is in bad condition, but there can be no possible doubt that Mr. Waterhouse's specimens have been correctly identified.

"Now that the true *melania* has at last come to light it is seen to be not a *Catophaga* allied to *ega* or *paulina*, but a *Tachyris* belonging to the group which contains *T. celestina* and *T. nero*. It is a peculiarly handsome and distinctively marked butterfly; and it is probable that only its presumable rarity, and the battered condition of the type specimen, have permitted the erroneous identifications which have been current for so many years."

Larva of Colias nastes, var. werdandi.—Mr. W. G. Sheldon exhibited a living larva of *Colias nastes*, var. *werdandi*, which he had bred from an ovum deposited by a ♀ captured at Abisko in Swedish Lapland; the natural food-plant is

Astragalus alpinus, L., but in captivity the larva fed upon white clover.

Southern Neuroptera.—Mr. W. J. Lucas exhibited two specimens of *Nemoptera bipennis*, Illig. (*lusitanica*, Leach), taken by Mr. A. H. Jones: one in the Cork woods at Almorima, Spain, on May 5th, 1911, and the other at Linea, Gibraltar, on the 28th. Also a specimen of *Lertha barbara* Klug, taken by Mr. H. Powell at Aflou, Oran, Algeria, on June 30th, 1911, and given to him by Dr. Chapman.

Mr. E. Dukinfield-Jones observed that the former species was a day-flier, and that the long, narrow hind-wings were not employed for flight but merely trailed behind the insect. Dr. Chapman said that his experience at Bejar, where the insect was common, was that it only flew towards dusk and until it got too dark to see it.

Sirex noctilio.—Mr. W. J. Lucas also exhibited a large specimen of *Sirex noctilio*, taken by himself at Leith Hill, Surrey, walking on the road, on September 8th, 1911.

A Coleopteron new to Britain.—Mr. H. St. J. Donisthorpe exhibited a species of *Coleoptera* new to Britain, *Lesteva luctuosa*, Fauvel, which he had taken in moss in a waterfall on the high ground in the Isle of Eigg, near Mull, on September 17th, 1911.

Bred Erastria venustula.—Mr. H. M. Edelsten showed some bred specimens of *Erastria venustula*; the larvae had fed readily on flowers of *Potentilla tormentilla*, and on garden forms of *Potentilla*, strawberry, and bramble blossoms, and later on lettuce leaves, which they seemed to prefer. They pupated below the surface of the ground in a strong cocoon.

A Male "Stick-insect."—Mr. K. G. Blair exhibited a ♂ and two ♀♀ of a "stick-insect" (? *Lonchodes* sp.), which is usually parthenogenetic, the ♂ being excessively rare, and which he had bred for several generations without any specimen of this sex appearing.

Mr. C. O. Waterhouse said he had bred three generations of this Phasmid and had had many hundreds of specimens, and he congratulated Mr. Blair on having the only male he had ever seen or heard of. He mentioned that of the specimens he had bred, one deposited between January 18th and

July 28th, 1910, 467 eggs, after which it died. He found that as a rule the eggs hatched in about five months after being laid, but a few were hatched sooner. The females generally began ovipositing when they were five or six months old.

Delias from New Guinea Mountains.—Dr. K. Jordan exhibited 46 forms of *Delias* from the mountains of New Guinea. The first of these peculiar mountain species were discovered late in the nineties in the Owen Stanley Range, British New Guinea, by a German, E. Weiske, and described by C. Ribbe in 1900, with the exception of *D. albertisi* and *D. discus*, which had already been known for some time. Since then A. S. Meek and lately also Messrs. Pratt have considerably added to the number. Whereas in other districts of the Oriental Region at the most seven or eight species (generally four to six) may be found in any locality, a surprising number are met with in the mountains of New Guinea from 3,000 or 4,000 ft. upwards. In suitable localities of the Owen Stanley Range no less than 24 species have been obtained, of which 18 are confined to the higher altitudes. These mountain *Delias* are known from three ranges—the Owen Stanley Mountains in British territory, the Snow Mountains in Southern Dutch New Guinea, and the Arfak Mountains in the north-west of the island—and we have also two species from a high altitude on the German-British boundary. It is most interesting to find (1) that each mountain range has its own forms, the geographical differences often being surprisingly great and undoubtedly of specific value; (2) that most of these forms represent each other, although they may be specifically distinct, and (3) that several species are known only from one or two ranges.

The exploration of these mountains being very incomplete, we may expect that representatives of most of the species as yet only known from one or two places will be obtained in the other mountains as well. A similar assemblage of *Delias* undoubtedly also exists in those high chains of the island which the collector has not yet touched.

Brazilian Sphingids.—The Rev. A. Miles Moss exhibited the following Sphingids from Pará, which had been identified

by Dr. JORDAN. *Amphimoea walkeri*, *Isognathus excelsior*, *Grammodia caicus*, with pupa spun up in a leaf, *Hemeroplanes inuus*, *Epistor gorgon*, ♂ and ♀, *Pholus phorbas*, *Xylophanes nechus*, with chrysalis, and *X. cosmius*, ♀, the first known specimen of this sex, as well as a larva, probably of some species of *Hemeroplanes*.

New Entomological Post at Cambridge.

The PRESIDENT mentioned that the University of Cambridge had decided to appoint a Demonstrator in Medical Entomology.

Wednesday, November 1st, 1911.

The Rev. F. D. MORICE, M.A., President, in the Chair.

Election of Honorary Fellows.

The PRESIDENT announced that the Council proposed Fr. ERIC WASMANN, of Valkenburg, Holland, as Honorary Fellow in the place of the late Herr P. C. T. SNELLEN, of Rotterdam, and Prof. J. H. COMSTOCK, of Cornell University, U.S.A., for the vacancy caused by the death of Dr. S. H. SCUDDER, of Cambridge, Massachusetts, both of whom were then elected.

Election of Fellows.

The following gentlemen were elected Fellows of the Society:—Messrs. T. J. ANDERSON, Teaninich, Craig Millar, Midlothian; EDWARD BERNARD ASHBY, 33, Park Road, Whitton, Middlesex; W. A. LAMBOURN, M.R.C.S., L.R.C.P., Omi Camp, Lagos, W. Africa; J. JACKSON MOUNSEY, 24, Glencairn Crescent, Edinburgh.

Exhibitions.

A SCARCE COLEOPTERON.—Dr. NICHOLSON showed a specimen of *Aleochara discipennis*, Muls. and Rey, taken in the early part of this year from moss in a small wood at Alphington, Devon. As there were several other carrion beetles with it, it is very likely that a dead animal rested on this spot last year. This species was introduced in 1907 by Mr. Champion

on the authority of specimens captured by the late Dr. Capron, and by Commander Walker in the Chatham district, and it has been recently taken by Dr. Sharp in the New Forest. It appears to be rare on the Continent.

Teratological Specimens.—Mr. J. R. le B. Tomlin exhibited a teratological specimen of the rare beetle *Triarthron maerkeli*, swept in the Wellington College district, Berks, this summer. It has the last two joints of left antenna completely soldered together, making a two-jointed instead of a three-jointed club. Also a specimen of *Longitarsus melanocephalus* (?) taken by Mr. J. Collins at Oxford, with legs and tarsi remarkably thickened.

Northern Neuroptera.—Mr. W. J. Lucas exhibited five specimens, three ♂ ♂ and two ♀ ♀ of *Panorpa germanica*, taken by Col. Yerbury, four at Dingwall in May, and one at Lockinver in July. One ♂ is practically immaculate, and the other two nearly so; the ♀ from Dingwall is sparsely spotted, while the one from Lockinver is more nearly normal. Five normal specimens from Surrey and Hants were shown for comparison.

A Travelled Insect.—Mr. C. J. Gahan exhibited a living specimen of *Aspidomorpha silacea*, Boh., an African species of *Cassididae*, which had been sent by Mr. G. St. John Mildmay from Nyali in British East Africa on October 7th, reaching London on October 28th.

Polyctenidae viviparous.—Dr. K. Jordan, who has lately been engaged on an examination of the specimens of *Polyctenidae* contained in the collection of the British Museum, announced that these insects, which are parasitic on bats in the tropics, are viviparous like the parasitic Orthopteron *Hemimerus*. The young are born at a very advanced stage, but yet differ considerably from the adult. Two of the forms (*spasmae* and *talpae*) described as distinct species, and lately placed in two different genera, are immature and adult examples of the same species.

Dr. Chapman remarked upon certain supposed instances of viviparous butterflies, saying that the idea originated in a mistake, the eggs having been ready to be laid at the time of the parents' death.

Rare British and Imported Coleoptera.—Mr. Harwood exhibited two specimens of *Micrurula melanocephala* taken near Bishop's Stortford by sweeping in the evening, which he believed to be var. *brunnea*, Heer. Also two specimens of *Ocypus cyaneus* taken by Mr. W. H. Harwood at Colchester, one in May and the other in June of this year, the first specimens taken in the district for nineteen years. Also a species of *Coccinella* taken in a case of Tasmanian apples at Colchester.

Sound made by a Longicorn Larva.—Dr. K. Jordan asked for information with regard to the following experience: When out late one night in the Bihar Mts. in Hungary, he heard, at short intervals, a subdued sound, decidedly more like chirping than knocking, which he attributed to some small species of Orthoptera. He located it to a telegraph-pole about fifteen yards away; but on examining the pole the sound proved to issue from underneath the bark, and here a fairly large larva (smaller than a full-grown larva of *Rhagium inquisitor*) of a Lepturid Longicorn beetle was found, which retreated so hastily into its hole that it could not be secured. Is it known of any Longicorn larva that it produces an imitation grasshopper-song?

African Species of Acraea.—Mr. H. Eltringham exhibited specimens of African Acraeas, to show that wide differences of colour and pattern may occur in a single species, and conversely, that certain species which can scarcely be distinguished by their outward appearance are nevertheless very distinct, as shown by the structure of the male armature. Thus *A. astrigera*, Butl., from E. Africa merges gradually into the same author's *A. pseudolycia*, through an intermediate form named f. *brunnea*. *A. astrigera* is a brilliant orange-and-scarlet form, whilst *pseudolycia* is black-and-white. In the same way *A. humilis*, Sharpe, was found to be specifically identical with *A. orestia*, Hew. The exhibitor remarked that he had been pleased to learn only that morning that his conclusions in regard to the latter species had just been confirmed by breeding, details of which he hoped to be able to publish on a future occasion. Mr. Eltringham further showed examples of *A. chambezi*, Neave, and *A. mansya*, Eltr.

These species could only be distinguished at sight by a difference in the position of one of the hind-wing spots, but the male armature showed differences of structure which were as great as those distinguishing any other species of African *Acraea*.

Several new species and forms were also shown, including *A. lofua*, Eltr., ♂ and ♀, *A. grosvenori*, Eltr., ♂, *A. aureola*, Eltr., ♂, *A. ella*, Eltr., ♂, *A. cinerea* subsp., *alberta*, Eltr., ♂, *A. periphanes* f. *acritoides*, Eltr., ♂, and *A. astrigera* f. *brunnea*, Eltr., ♂ and ♀.

Dr. Jordan remarked on the extreme variability of the genus and its allies, geographically, individually, and even in the characters of the genitalia.

Mr. Bethune-Baker remarked on the unreliability of the genitalia in certain *Lycaenidae*.

The President stated that the ♂ genitalia were, as a rule, reliable in the Aculeata, but in the *Tenthredinidae* the ♂ genitalia were quite useless for specific determination, though the ♀♀ afford excellent characters.

The Hon. Walter Rothschild remarked on the identity of the ♂ genitalia in certain distinct species of *Macroglossinae*.

Papers.

Com. Walker read the following paper on "The Effect of Temperature on Animal (especially Insect) Life," by A. G. Butler, Ph.D., F.L.S. :—

"Lieut.-Colonel N. Manders' paper on 'A Factor in the Production of Mutual Resemblance in Allied Species of Butterflies' (Trans. Ent. Soc. 1911, part ii, pp. 417–425) is of especial interest to me, inasmuch as it supports the facts already proved with regard to the effect of a superhumid warm temperature in intensifying and deepening the colouring in both insects and birds.

"It is now well known that the wet-season forms of butterflies inhabiting tropical climates are as a rule more boldly marked, with more vivid and deeper colouring, than those which emerge in the dry season. It is also a fact that when a brown ground-colour deepens until it approaches black it is liable to be glossed with purple or blue: we see this not only

in many insects, but also in many birds, the genera *Merula* and *Corvus* being examples.

"Prof. C. William Beebe, Curator of Birds in the New York Zoological Society, published a most valuable paper in 1907 entitled 'Geographic Variation in Birds, with especial reference to the effects of humidity,' in which he gave a full account of most instructive experiments carried out by him in the case of three species of American birds, a superhumid atmosphere having greatly increased the amount of black in the plumage in quite a short time.

"In the same article Prof. Beebe refers to a paper by Mr. Seth-Smith in the 'Avicultural Magazine,' in which an attempt was made to show that *Munia castaneithorax* (one of the small Australian weaving-finches) was only a moist climatic phase of *M. flaviprymna*, which inhabits a much drier region; he also reproduces the excellent plate which accompanied Mr. Seth-Smith's paper, and which shows a complete series of intergrades between the two supposed species, several of which had come into existence after the importation of *M. flaviprymna* to this country.

"Mr. Seth-Smith believed that our moist climate had immediately produced reversion to the chestnut-breasted type, a possibility quite conceivable if the birds were imported early in a wet summer, but I think not otherwise; for in 1907 I turned a pair into an outdoor aviary with very little cover, and one of these lived there throughout the moist winter of 1907–8 without acquiring the slightest change of colouring; so that heat, as well as humidity, seems to be a necessary factor.

"Without question a great deal too much has been made of protective assimilation; I believe myself that many creatures of related genera simply resemble one another because there has been no object in differentiating their colouring; their structure has been slowly modified, but the pattern and colours being more or less protective have been retained and even their tendency to vary has retained its impetus towards a fixed gradation in one direction; so that in the *Ithomiinae* we have a series of genera, all equally protected, the species in which are often remarkably alike. A similar case occurs

in the two S. American starlings, *Leistes superciliaris* and *Trupialis defilippii*, which closely resemble each other in pattern, colouring, and even in many of their habits, both being ground-birds nesting in marshy land, both taking a short flight in the air to utter their execrable songs, and both stooping to conceal their crimson breasts at the approach of danger.

"Again, many supposed mimetic forms are known not to occur together; in some cases the one is a mountain form, the other confined to the plains (a case of this kind was commented upon some years since at a meeting of our Society, when a Lycaenid with an orange patch in the front wings was supposed to be a copy of a *Teracolus* *); in others the distribution of the supposed mimetic forms is entirely different.

"It has been asserted that Nature does not, like History, repeat itself; but this is a great mistake, for I have not infrequently been struck by resemblances between butterflies and moths inhabiting different countries; as an instance, the little Agaristid moth *Ophthalmis lincea* and its near allies are remarkably like some of the species of the New World butterfly genus *Lymnas*.

"Is it absurd to suppose that variation tends to run in accordance with fixed laws and in one direction when not interfered with by change of temperature? I think not, for we note similar variations running through large groups of species: in the *Argynnides*, for instance, the black markings on the upper surface and the silver markings on the under surface run together into large patches. And if this is the case with species of the same genus, why not in genera of the same family?

"Seasons undoubtedly affect whole subfamilies of butterflies in a similar manner, and this seems to me to indicate that the variation in related forms is to a great extent limited to certain fixed lines."

The following papers were also communicated:—

"Parthenogenesis in Worker Ants, with special reference to two colonies of *Lasius niger*, Linn.," by W. C. Crawley, B.A.

* I was not present at the meeting, but I believe I am correct in the above statement.

"A Monograph of the genus *Acraea*," by H. Eltringham, M.A., F.Z.S.

Wednesday, November 15th, 1911.

The Rev. F. D. Morice, M.A., President, in the Chair.

Election of a Fellow.

The Rev. Samuel Proudfoot, 6 Lyme Grove, Altrincham, Cheshire, was elected a Fellow of the Society.

Presentation.

The President announced that Mr. J. H. Durrant, a member of the Council, had presented to the Society an excellent photographic portrait of Lord Walsingham, a former President of the Society, and that the Council had arranged to have it framed and hung in the Library. He offered the thanks of the Society to Mr. Durrant for the gift.

Nomination of Officers and Council.

The Rev. G. Wheeler, one of the Secretaries, announced that the Council had nominated the following Fellows to serve as Officers and Members of the Council for the ensuing year:—*President*, the Rev. F. D. Morice, M.A.; *Treasurer*, Albert Hugh Jones; *Secretaries*, Commander J. J. Walker, M.A., R.N., F.L.S., and the Rev. George Wheeler, M.A., F.Z.S.; *Librarian*, George Charles Champion, A.L.S., F.Z.S.; *Other Members of the Council*, Robert Adkin, George T. Bethune-Baker, F.L.S., F.Z.S., Malcolm Burr, D.Sc., F.L.S., F.Z.S., etc., Horace St. J. Donisthorpe, F.Z.S., John Hartley Durrant, Stanley Edwards, F.L.S., F.Z.S., A. E. Gibbs, F.L.S., F.R.H.S., W. E. Sharp, Alfred Sich, J. R. le B. Tomlin, M.A., Henry Jerome Turner, Colbran J. Wainwright.

Exhibitions.

A New Zealand Weevil.—Commander Walker exhibited three specimens of *Phaedrophilus o'connori*, Broun, a large

and handsome weevil from Mount Quoin, Kaitoke, South Island, New Zealand. The specimens were taken by Mr. G. V. Hudson, F.E.S., of Wellington, N.Z., at an elevation of 3,900 ft., in December 1910.

A Rare Tortrix.—Commander Walker also exhibited a specimen of the rare Tortrix, *Phalonia* (*Eupoecilia*) *implicitana*, Wocke, taken by Mr. H. G. Champion at Shoreham, Sussex, August 1911.

A New British Ant.—Mr. W. C. Crawley exhibited a ♀ and a ☿ of *Leptothorax tuberum*, Fabr., subspecies *corticalis*, Schenk, new to Britain, found with two larvae in an empty beech-nut at Pangbourne, Berks, April 24, 1904. It was named by Forel as a var. with long spines.

A Coccinellid and Mimosa Gum.—Mr. N. S. Sennett exhibited some Coccinellids as found on Mimosa trees, and read the following note:—"I have here for exhibition several specimens of *Chilocorus bipustulatus* which I took recently at Mont' Estoril in Portugal. On examining the small exudations of gum on the Mimosa trees, I discovered these beetles, presenting what I take to be a remarkable though hitherto unrecorded case of Protective Mimicry, feeding and resting on the bark in considerable numbers, and I procured specimens of the bark and a number of the beetles, which I have mounted as I found them. It will be noticed that the narrow transverse reddish band about the middle of each elytron gives to the insect a remarkable semblance of semi-transparency which perfectly coincides with the appearance of the globules of gum. I have also included in this case a few specimens of the lichen which is abundant on all these trees, and amongst which the beetles probably find the Aphides on which they subsist. As far as I am aware, the Mimosa tree is not indigenous to Portugal, but it is, of course, quite possible that the beetles were introduced with the trees. It would be interesting to find out why this particular species requires protective disguise, as the *Coccinellidae* as a family would appear to be remarkably immune from the depredations of enemies."

Mr. G. C. Champion observed that the species was a native of Britain and not uncommon.

Bred Pyrameis cardui.—Mr. L. W. Newman showed a long series of *Pyrameis cardui*, bred from ♀ ♀ captured at Folkestone on September 2nd last. Ova were laid at once and placed in a hot-house kept at about 80 degrees; they hatched on September 7th and larvae fed up very rapidly on stinging-nettle, the first pupating on September 30th. Imagines started to emerge about a week later, and all were out by October 16th—some 500 in all. Considerable variation occurred, the most noteworthy being the large apical white spot on a few having black scaling so thick as almost to obscure it, while in others this black scaling was present but was not so intense. A fair percentage were very pink, and a few very devoid of this colour. Minor variation, such as an extra spot, was represented, but the majority of the brood were normal.

Rare Diptera.—Mr. H. W. Andrews exhibited two rare species of Diptera from North Kent, viz. *Syrphus lineola*, Ztt., a ♂, taken at Bexley on July 8th, and *Sciomyza simplex*, Fln., both sexes, taken in the Thames Marshes on June 23rd and July 1st, all in the present year.

Mr. J. E. Collin remarked that he had only taken the latter species at Ringwood and in Suffolk.

A Probable Specimen of Cidaria concinnata.—Mr. E. A. Cockayne exhibited a Geometer taken at Tongue, Sutherland, July 5th, 1906, closely resembling *Cidaria* (*Dysstroma*) *concinnata*, Steph., specimens of which were placed below for comparison. This species, first clearly differentiated by Prout (Ent. Record, xx, p. 143), has only been recorded once, and that doubtfully, from the mainland of Scotland. No other specimens were taken either resembling that exhibited or of typical *C. russata*.

Some Local Forms of Melanargia galathea.—Mr. J. Platt Barrett exhibited a drawer of *Melanargia galathea* containing:—English specimens, altitude under 500 ft., with one aberration. Specimens from the Alps, (1) Brigue, 2,000 to 3,000 ft., paler than (2) and probably larger; (2) Bérisal, over 5,000 ft., dark. From the Apennines, (3) Pracchia, near Pistoja, 3,000 ft., the smallest form, dark. From Calabria, (4) Gioja Tauro, Plain of Radicena, near sea-level, large and very dark;

(5) Palmi, Monte Elia, 1,000 ft., very dark; (6) Aspromonte, above Scylla, over 2,000 ft., very dark. From Sicily, (7) Mount Etna, over 3,000 ft., moderate size, paler; (8) Monte Cicci (near Messina), 2,000 ft., large and dark; (9) Monte Scuderi, 1,000 ft., very large and rather pale; (10) Messina (Gravitelli), 500 to 800 ft., large and dark (var. *procida*); (11) Megara Hybloea, sea-level nearly, large and pale; (12) Syracuse, sea-level nearly (var. *syracusana*, Zell.). The last were taken near the River Anapo, where *galathea* was plentiful near a cornfield. Mr. Barrett observed that Zeller's description of "*syracusana*" is very simple; "larger; abdomen, back ashen; belly white." One underside was exhibited to show the latter peculiarity, and the undersides were described as being even more interesting than the upper. The exhibitor added that it is seldom wise to make deductions from limited information, but that there seemed reason to think that high altitude reduces the size of this butterfly, but that with regard to blackness on the other hand, specimens from near sea-level in Calabria were equally dark with those taken over 2,000 ft. up the mountain.

A Gigantic Spider.—Mr. A. E. Tonge exhibited a very fine *Mygale* from California, together with a newspaper cutting giving (from an eminently unscientific point of view) an amusing account of its capture on a child's arm by its terrified but determined mother.

An "imitation" Larva.—Mr. J. R. le B. Tomlin showed a specimen which he said was not strictly an entomological exhibit, but from its curious resemblance to a caterpillar might be of momentary interest to Fellows. It was in reality a species of West Indian oyster (*Ostrea frons*, L.) which attaches itself to twigs.

Professor Poulton remarked that both this and the Coccinellid exhibited by Mr. Sennett were probably cases of accidental resemblance.

Rhodesian Insects as Prey.—Professor E. B. Poulton exhibited the following specimens sent to him by Mr. C. F. M. Swynnerton, both of which had been captured on the outskirts (3,800 ft.) of Chirinda Forest, Gazaland, S.E. Rhodesia.

1. The female form *hippocoon* of *Papilio dardanus cenea*, Stoll,

rescued, September 8, 1911, by one of his native collectors from a M'lanje Bulbul (*Phyllostrephus milanjensis*). The head was wanting, and there were symmetrical injuries at the anal angle of the hind-wings similar to those so often seen in living butterflies.

2. Two wings of *Precis archesia*, Cr., ⊙, and the fragments of a Blattid, probably of the genus *Deropeltis*, taken June 25, 1911, from a spider's web. When noticed four days earlier the wings of the *Precis* were still attached to its body, and the latter had been attacked in the manner characteristic of a largish spider. The butterfly had probably sheltered in the thatch to which the web was fixed.

Instances of Mimicry exhibited by certain Sarawak Insects.—Professor Poulton also exhibited specimens sent by Mr. J. C. Moulton from Sarawak, and said that before doing so, and reading Mr. Moulton's account of them, he wished to acknowledge the kind help he had received from Mr. C. J. Gahan, who had compared several of the Coleoptera with the types, and had described one new species of *Daphisia*, and also the kind assistance rendered to him by Sir George Hampson. He then communicated the following paper by Mr. J. C. Moulton:—

"Among some recent additions to the insect collections in the Sarawak Museum, I noticed certain curious species which, by their remarkable resemblance to species belonging to very different families, afforded excellent examples illustrating the theory of mimicry. As some of these new captures prove to be new species, and as unfortunately they add to their rarity and value by being unique specimens, I have thought it advisable to send them to England for lasting preservation in some well-known entomological museum, where they will be safe from the ravages of a tropical climate and at the same time easily available for inspection and study. With this end in view it seemed a good opportunity first to draw attention to the *meaning* of the coloration exhibited by these insects, and so I am asking my friend and former teacher, Professor Poulton, to be kind enough to exhibit the little collection on my behalf at one of the meetings of the Entomological Society before giving them a permanent place in the Hope Collection.

"Before proceeding further, mention must be made of an extensive memoir by Mr. R. Shelford, which appeared in the Proceedings of the Zoological Society of London for 1902 (pp. 230–284, plates xix–xxiii), on the subject of 'Mimetic Insects and Spiders from Borneo and Singapore.' As his account in a general way covers certain of the instances mentioned here, the following notes may be regarded simply as a humble supplement to that memoir.

I. Mimetic Lepidoptera.

"1. *Moth* (Fam. *Callidulidae*) mimicking a butterfly (Fam. *Hesperidae*).

"The moth in this case is *Callidula abisara*, Moore, a common day-flying species, which flies low and slowly for short distances, frequenting shady jungle paths or half sunlit patches in mountain forests. The yellow-chrome underside is undoubtedly procryptic and is not noticeable in flight, though when at rest the wings are folded perpendicularly over the head and body, and the insect becomes invisible. The upperside, it will be noticed, has a simple pattern consisting of a dark tawny-fuscous ground-colour relieved in the fore-wing by a conspicuous subapical orange bar.

"The Hesperid (*Koruthaiolos xanites*, Butl.) has exactly the same pattern on the upperside, but its underside resembles the upper, and possesses the usual dark ground-colour typical of this section of Bornean Hesperidae. On one occasion, while collecting on Mount Matang (near Kuching), at an altitude of 2,000 ft., I watched this Hesperid flying slowly along the side of the path in front of me, stopping every few yards and then fluttering on again, and I was astonished to notice the resemblance in its flight to the moth, an example of which I had captured on the path about ten minutes before.

"The advantage of this pattern to the moth is at once evident, for with its slow flight and a pattern resembling any of the *swiftly* flying *Hesperidae* the advantage would be nil, but given a slow flight and a pattern resembling a *slow* flying Hesperid, then the advantage becomes very real. The instance may be classed under the heading of pseudaposematic mimicry,

since the moth is very probably palatable and the Hesperid the reverse.

" Two other Hesperids, occurring in Sarawak, bear the same upperside pattern, viz. *Kerana gemmifer*, Butl., and the larger *K. armata*, Druce. Both are fairly common species, occurring in the same locality as *Koruthaiolos xanites*, and possibly present a case of synaposematic mimicry, but I do not know their flight, and so refrain from further comment.

" 2. Moth (Sub-fam. *Chalcosiinae*) mimicking a butterfly (Fam. *Pieridae*). I had for some time suspected the ♀ of the Chalcosid moth *Mimeuploea* (*Pidorus*) *inclusus*, Wlk., of being a mimic of the common Pierine, *Terias hecabe*, L., but it was not till the capture of the ♀ of an interesting allied species *Chalcosia* (*Cyclosia*) *hecabe*, Jord., in May last, that I felt at all positive about it. The majority of Sarawak females of *M.* (*P.*) *inclusus*, which is common enough, have a black hind-margin to the fore-wing, the inner edge of which is moderately even, and not indented in that marked manner characteristic of the Pierine, *Terias hecabe*. Now the ♀ of *Chalcosia* (*Cyclosia*) *hecabe* has this very indentation reproduced, and possessing also a pale yellowish ground-colour, is an excellent mimic of the Pierine.* *M.* (*P.*) *inclusus*, on the other hand, exhibits only a very slight tendency towards this indentation in the black hind-marginal border. This common Chalcosid flies slowly and for short distances in open sunny places, and settles on the upperside of leaves; it is abundant, though, of course, not to be met with in anything like the numbers that may be seen of *T. hecabe* anywhere in Sarawak. It settles with fore-wings folded over the hind-wings, presenting a flat surface, so that the *hecabe*-pattern is conspicuous. For the theory of mimicry between these two species it is, of course, unfortunate that the Pierine invariably settles with wings closed and erect, nor does this Pierine, when settled, open and close its wings slowly, so that one can see the upperside pattern, as do some of the Papilios, e. g. *P. agamemnon*. But *in flight* there is no doubt that the moth is sufficiently like the Pierine to be mistaken for it.

* Both these ♀ ♀, together with their ♂ ♂, which are entirely unlike *Terias hecabe*, are figured in Seitz, *Gross-Schmett.*, x, pl. 3, d (1907).—E. B. P.

"*Terias hecabe* can be seen frequently in closely packed 'flocks' of 50 to 100 individuals settled on damp spots by the side of many rivers in Sarawak, and they should form an easy prey to any bird or insect enemy; but although I have often watched them thus settled together with other larger brilliant yellow Pierines, I have never seen them attacked; and when disturbed, instead of dispersing and flying away, they fly round and round in a thick cloud just over the same place, thus presenting an easy capture with the net.

"Various writers have noted the common occurrence of this species in the East, and certainly in Sarawak it is one of the commonest butterflies.

"Mr. Shelford mentions the resemblance of *M.* (*P.*) *inclusus* to a *Terias*, as an instance of mimicry, in his table (*l. c.*, p. 257).

II. Mimetic Coleoptera.

"1. *Between Clerids and Longicorns.*

"(*a*) The black-and-white-spotted pattern, which we notice in the Longicorn (Fam. *Lamiidae*, Sub-fam. *Phytoeciinae*), *Daphisia pulchella*, Pascoe, a beautiful mimic of the little Clerid *Callimerus bellus*, Gorham. This resemblance is described and figured in Mr. Shelford's memoir (*l. c.*, p. 247, pl. xxiii, f. 53 and 55), but it is such a beautiful example that I venture to send for exhibition the model and mimic from the same locality and taken in the same fortnight.

"(*b*) The black-and-yellow-spotted pattern, adopted by a Longicorn synaposematic association into which enters the Clerid *Callimerus mysticus*, Gorh.

"This Longicorn association is composed of

(i) The common and almost certainly highly distasteful Cerambycid, *Caloclytus annularis*, Fab. Figured by Mr. Shelford as *Chlorophorus annularis* (*l. c.*, pl. xx, f. 31).

(ii) The Lamiid (Sub-family *Phytoeciinae*) *Daphisia clytoides*, Gahan.

"This species, kindly described by Mr. C. J. Gahan in the appendix to this paper, was figured by Mr. Shelford as *Daphisia* sp. ? (pl. xx, f. 34).

(iii) The rare Lamiid *Cylindrepomus laetus*, Pasc., var. Figured by Mr. Shelford as *Cylindrepomus*? form of *comis*, Pasc. (pl. xx, f. 33).

"Professor Poulton has attached some interesting remarks on the far-reaching mimetic effects of this *Caloclytus*-pattern, to Mr. Shelford's account of the association (*l. c.*, pp. 250–2). It is therefore pleasant to record the entry of a member of a totally distinct family of Coleoptera into this synaposematic combination, thus affording an instructive comparison with the first Clerid-Longicorn instance given above, in which the Clerid functioned as model instead of mimic.

"2. *Between Hispids and Longicorns.*

"On a recent collecting expedition up the Limbang River in Sarawak (April 1910), we were fortunate enough to capture a little Longicorn which bore a remarkable resemblance to the spinose *Hispidae* of the genus *Dactylispa*. Dr. Chr. Aurivillius has kindly examined it for me, and finding it new to science, he proposes to describe it (or has already described it) under the name of *Plaxomicrus hispoides* (*Phytoeciinae*).* I send with it for exhibition a specimen of the common Hispid, *Dactylispa longicuspis*, Gestro, which was taken in the same district and month (possibly on the same day). It should be noted that *all* the Sarawak Museum examples of this species of *Dactylispa* come from the region watered by the Limbang, Trusan and Lawas Rivers, all of which are adjacent and debouch into Brunei Bay.

"The little tufts of hair on the elytra of the Longicorn, so formed as to resemble the spines on the Hispid, recall the instance of another Longicorn (*Zelota spathomelina*, Gahan), exhibiting a somewhat similar development (but bearing of course an entirely different pattern from that of the Hispid-like Longicorn), on this occasion in mimicry of the spined Endomychid, *Spathomeles turritus*, Gerst. Mr. Shelford figures and records this latter instance (*l. c.*, p. 247, pl. xxiii, f. 56, 57). He also mentions the presence of the larger red and black *Hispidae* with mimetic Longicorns in his great Lycoid distasteful association, but I believe that this is the first instance

* Mr. C. J. Gahan considers that the species more probably belongs to the allied genus *Chreonoma*.—E. B. P.

known of a Longicorn going to the length of pseudo-spine-development on the elytra in mimicry of a Hispid.

Explanation of Exhibition.

I. Mimetic Lepidoptera.

1. The Butterfly (Fam. *Hesperidae*), *Koruthaiolos xanites*, Butler, mimicked by
2. The Moth (Fam. *Callidulidae*), *Callidula abisara*, Moore.
   Locality: near Kuching, Sarawak, April 1909. Both at the 4th mile, 'Rock Road,' the Hesperid on the 10th, the moth on the 24th.
3. The Butterfly (Fam. *Pieridae*), *Terias hecabe*, L., mimicked by
4. The ♀ of the Moth (Sub-fam. *Chalcosiinae*), *Mimeuploea* (*Pidorus*) *inclusus*, Walk.
5. The ♀ of the Moth (Sub-fam. *Chalcosiinae*), *Chalcosia* (*Cyclosia*) *hecabe*, Jord.
   Localities: Kuching, Sarawak, July 27, 1896 (No. 3), and Madihit, Limbang R., Sarawak, 1911, No. 4 on May 21, No. 5 on May 26.

II. Mimetic Coleoptera.

1. The Longicorn, *Daphisia pulchella*, Pascoe, mimic of
2. The Clerid *Callimerus bellus*, Gorham.
   Locality: Matang Road, near Kuching, Sarawak, July 1911. No. 1 on the 12th, No. 2 on the 25th.
3. The Longicorn (Fam. *Lamiidae*), *Daphisia clytoides*, Gahan, synaposematic mimic.
4. The Longicorn (Fam. *Lamiidae*), *Cylindrepomus laetus*, Pasc., var., synaposematic mimic.
5. The Longicorn (Fam. *Cerambycidae*), *Caloclytus annularis*, Fab., synaposematic model.
6. The Clerid, *Callimerus mysticus*, Gorham, pseudaposematic* mimic.

* More probably synaposematic in view of the fact that another species of the same genus is the model of *Daphisia pulchella* (see p. lxxvi). There are in fact details in the pattern of *Daphisia clytoides* which suggest its possible secondary mimetic association with the Clerid. Observations during life would be particularly valuable in settling this point.—E. B. P.

Localities: Nos. 3 and 4, Mt. Matang (3,600 ft.), near Kuching, Sarawak, June 1900, and (3,200 ft.) July 30, 1909.

No. 5, Danau, near Kuching, November 18, 1909. Also taken at Lawas among other places. A common species in Sarawak.

No. 6, Lawas, August 26, 1909.

7. The Lamiid Longicorn *Plaxomicrus hispoides*, Auriv. mimic of
8. The Clerid, *Dactylispa longicuspis*, Gestro.

Locality: R. Limbang, April 1910."

Appendix by C. J. Gahan.

Daphisia clytoides, Gahan, sp. n.

Brownish black. Head, prothorax, scutellum and body beneath with a rather dense covering of tawny-yellow pubescence, a similar pubescence forming bands and spots on the elytra; head marked with a median black band on the vertex; prothorax with four longitudinal black bands—two on the disc and one on each side; these bands, which stop short before base and apex, are closely and rather strongly punctured; the tawny-yellow marks on the elytra consist of (1) a sutural band which widens out at the base and spreads across each elytron to the shoulder, and which also widens out near the apex, (2) a short oblique band given off on each side from the sutural band just before the middle, (3) an elongate, club-shaped spot or band running from the outer end of the oblique band towards the base, (4) a round spot on each elytron placed close to the sutural band about half-way between the middle and the apex. Metathorax with one, and the abdomen with a row of blackish spots along each side. Where the elytra are blackish in colour, they are seen to be rather strongly punctured.

Length 11, breadth 3 mm.

Hab. Borneo: Matang, 3,600 ft.

The actual specimen here described is figured by Mr. Shelford in Proc. Zool. Soc., 1902, on p. 25 and pl. xx, f. 34.

Cylindrepomus laetus, Pasc., var.

From the type form of *C. laetus*, this variety differs chiefly by the colour of the pubescence covering the prothorax and forming the bands on the elytra, the colour being yellowish-brown instead of ashy-grey as in the type. It differs also in having the short sutural

band at the apex of the elytra continued forward to join the postero-median transverse band, and the latter is a little more arcuate than is the corresponding band in the type.

Hab. Borneo: Matang.

This variety is figured by Mr. Shelford as "? form of *comi* " (*l. c.*, pl. xx, f. 33).

A New African Lycaenid.—Professor Poulton exhibited six male examples of a remarkable Lycaenid, all captured, Nov. 22, 1910, in the Uhehe District (3,000–3,500 ft.) of German East Africa, by Mr. S. A. Neave, F.E.S. The pattern and brilliant colours, which were extraordinary in a Lycaenid, strongly suggested, on both upper and under surface, the appearance, although on a smaller scale, of an *Acraea* of the type of *A. anemosa*, Hew. Mr. Neave wrote to Professor Poulton from Mombasa, Jan. 6, 1911:—

"I had a very fairly successful journey across German East Africa.

"I got a few good Lepidoptera, the most interesting in the way of mimicry being a large Lycaenid which I do not remember having seen before. I took six individuals all from one spot.

"The first one I saw completely took me in (though I watched it for nearly five minutes while waiting for a net to come up) not so much by its appearance as by its attitude. It was sunning itself at the top of a grass-head with the wings expanded but the primaries making an angle of 45 degrees with the body and covering the secondaries, exactly as many Acraeas sun themselves. All the time I was watching this first specimen I was quite satisfied that I had got hold of a new *Acraea*, the idea of a Lycaenid in such an attitude and position never entering my head. I subsequently took in the same spot five others, some of them doing the same thing, others on the wing. The flight was less powerful than that of *Mimacraea marshalli*, Trim."

Mr. H. H. Druce and Mr. G. T. Bethune-Baker stated that the species was entirely new to them.

An Abnormal Coleopteron.—Mr. Stanley Edwards exhibited a specimen of *Oxynopterus audouini*, a beetle from Borneo, with abnormal antennae, apparently gynandromor-

ERRATA.

PLATES.

Plates XL and XLIV, *for* WITTLESIA *read* WITLESIA.

Plates XXXV—XLIV. The photographs are by Mr. F. Noad Clark, and are attributed in error to Mr. A. E. Tonge.

In Plates LVI and LVII the names of the species figured have been transposed. Plate LVI represents *Hydroecia americana*, and Plate LVII, *H. crinanensis*.

The date of the first set of Proceedings, for 1840, on p. 763, should be Feb. 1st, 1841, instead of Jan. 1st, 1841.

The fourth date from the end, Dec. 1st, 1846, should be Jan. 1st, 1847.

The last two dates should be 1848, not 1847.

phous, and explained that Mr. Gahan had dissected it and found the genitalia to be entirely ♀.

Scarce Coleoptera.—Mr. H. C. Dollman exhibited the following species of Coleoptera:—*Philonthus intermedius*, Bois.; ab. *donisthorpei*, Dollman, described in the Ent. Rec., December 1910; *Stenus formicetorum*, Mann., introduced as British in the Ent. Rec., April 1911; *Bembidium quadripustulatum*, Dej., an example from Ditchling, Sussex, August 17, 1911; *Hypophloeus linearis*, F., retaken at Oxshott, in July of this year; a species hitherto taken in Great Britain only in Surrey, at Oxshott and Woking; *Mycetoporus forticornis*, Fauv. (one specimen from the New Forest), with *M. clavicornis*, Steph., for comparison; *Philonthus corruscus*, Gr., taken from a dead rabbit at Ditchling; *Stenus morio*, Gr., from Ditchling, taken in October 1910.

Bred series of Acraea orestia and A. humilis.—Mr. H. Eltringham exhibited a bred series of *Acraea orestia*, Hew., containing the typical form, and also the *A. humilis* of Miss E. M. Sharpe, thus demonstrating the truth of the conclusion at which he had previously arrived as to the specific identity of these two forms. The exhibit was accompanied by an extract from a letter received by Professor Poulton from Dr. G. D. H. Carpenter, who had bred the series at Damba Island, Victoria Nyanza, and who had generously presented the specimens to the Hope Department at Oxford. Dr. Carpenter's note was as follows: "Reared, September 11 [1911], larvae found very young, feeding all together on one leaf, cheek by jowl. I took them for *alciope* larvae, and was much surprised by the ultimate result. Pupae and larvae were both exactly like *alciope* so far as I could tell, but I had no *alciope* larvae to compare with them at the time, as no idea of a different species was suggested."

Mr. Eltringham also exhibited a coloured drawing of the larva of *alciope* in order to give an idea of the appearance of the larvae from which *orestia* had been bred. He also showed three ♂ black and yellow Acraeas, one of which was the *A. circeis* of Drury from Sierra Leone. The other two while differing in appearance from *A. circeis* were themselves exactly alike, but for the fact that the two tarsal claws of the second

and third pairs of feet were equal and similar in one specimen and unequal and dissimilar in the other. He pointed out that in all the African Acraeas, except about sixteen species, the male tarsal claws were unequal. *A. circeis* was amongst the latter, and in many cases of close similarity of pattern this feature provided a ready means of distinction. In such cases, however, there was as a rule some difference of pattern correlated with the structural difference in the claws. The present case was an exception to that rule. He had hitherto regarded the form now exhibited, which was recognisably different from *A. circeis*, as *A. servona*, but the discovery of a form identical in appearance with the supposed *servona*, and differing only in the structure of the claws, raised a serious difficulty, inasmuch as the type of *servona* was a female, and since all female Acraeas had equal claws, it was quite impossible to say to which of these males the type *servona* belonged. There were female examples in the series from which the present specimens had been taken, but they were all alike. The equal and the unequal clawed forms must apparently be regarded as different species in spite of the absence of difference in wing pattern. If the females of both these species were as similar in appearance as the males the true identity of *A. servona* would never be discovered. The male armature of these species was of a very simple character, and afforded but little evidence of a specific distinction.

In answer to an inquiry from Mr. Bethune-Baker, Mr. Eltringham said that he had made many preparations of the ♀ organs, but that in this group of Acraeas they did not provide distinctive characteristics. A long and interesting discussion followed on the question of the importance of the tarsal claws as a means of specific distinction, and on the possible correlation of uneven claws in the ♂ and the abdominal sac in the ♀, in which the President, Professor Poulton, both the Secretaries, and Messrs. Gahan, Collin, Waterhouse and Janson joined.

Descriptions of British Rhopalocera.—Mr. Champion called attention to a paper by M. Roger Vérity in the "Bulletin de la Société Entomologique de France," Séance

du 11 Octobre, 1911, on new Scottish races of *Erebia aethiops*, Esp. (race *caledonia*), *Satyrus semele* (race *scota*), and *Paraye megaera* (race *caledonia*).

Papers.

The following papers were communicated :—" Descriptions of South American Micro-Lepidoptera," by E. Meyrick, B.A., F.R.S.

"New Species of Hawaiian Hymenoptera, with notes on some previously described," by R. C. L. Perkins, D.Sc., M.A., F.E.S.

" Notes on Hawaiian Hemiptera, with descriptions of new Species," by R. C. L. Perkins, D.Sc., M.A., F.E.S.

" Experiments in the Formation of Colonies by *Lasius fuliginosus*, ♀ ♀," by Horace Donisthorpe, F.Z.S., and W. C. Crawley, F.E.S.

Wednesday, December 6th, 1911.

The Rev. F. D. Morice, M.A., President, in the Chair.

Election of Fellows.

The following gentlemen were elected Fellows of the Society: Dr. Beckwith Whitehouse, 52 Newhall Street, Birmingham; Messrs. F. W. Edwards, Kingswear, Cornwall Road, Harrow; Douglas Pearson, Chilwell House, Chilwell, Notts; B. H. Smith, B.A., Edgehill, Warlingham, Surrey; C. F. M. Swynnerton, Mt. Chirinda, Melsetter, S.E. Rhodesia.

Exhibitions.

A Phasmid New to Science.—Mr. C. J. Gahan exhibited an insect recently brought to the British Museum, and recognised by him as belonging to *Prisopus*, a remarkable and specially interesting genus of Phasmidae. It was found at Xapury, on the river Acre in the Amazon Valley by Mr. F. G. Fisher, who had very kindly offered to present it to the Museum. The species of *Prisopus* inhabit tropical America,

and appear to be very rare, very few specimens having yet found their way into public or private collections. The one now exhibited was new, and he proposed to name it *Prisopus fisheri* in honour of its discoverer. It resembled other species of the genus in its general style of colour and in its adaptational structure, but could be readily distinguished from them by the very prominent hump or swelling near the base of each wing-cover, and more especially by the strong triangular process projecting from each side of the metathorax just in front of the hind coxae. These characters, it would be observed, were only part of the general scheme of structure and coloration by which the insect was eminently adapted for concealment while living at rest on the bark of a tree. That was in fact the place where it was found. Mr. Fisher, he said, could not recall whether it was on a sapling or on a small tree, but he was quite certain that it was either the one or the other; and he found it in the day-time. The district was part of a forest track in a low-lying alluvial plain, with no rocks or mountain streams anywhere near. These facts he wished to emphasize, because now he had to call attention to a story handed down to us from the year 1866 and implicitly believed in by different writers up to the present time. In that year Andrew Murray published a paper in the "Annals and Magazine of Natural History," giving an account of the aquatic habits of the *Prisopi*, and pointing out with a great wealth of detail all the wonderful adaptations of structure which fitted these insects for living attached to stones under the water of swiftly running mountain streams. No one hitherto had questioned the truth of that account, notwithstanding that it depended upon "the veracity of the person" who first told the story to Mr. Alexander Fry, from whom Murray derived it, adding to it, however, by the exercise of his imagination all the details necessary to ensure its acceptance. The story might possibly have had some slight foundation in fact, but he believed it to be essentially untrue. *Prisopus flabelliformis*, the species to which Murray's account more particularly applied, presented exactly the same kind of adaptation as those to be seen in the specimen shown that evening; and it was impossible to believe that the two insects could have

such different habits of life. The purpose of those adaptations was perfectly obvious, as he felt certain every Fellow present would admit. He had confidence, therefore, in stating that the *Prisopi*, so far as their habits were concerned, were not at all exceptional, but were just like all the other members of the same family, the habits of which were well known and well understood. From this he was led to offer some remarks about another genus of Phasmidae which had an interest of the same kind. The genus *Cotylosoma* has on each side of the metathorax a row of five remarkable leaf-like structures; and Wood-Mason, the author of the genus, had no hesitation in describing these as tracheal gills. Dr. Sharp and Mr. Waterhouse had questioned this interpretation of the structures. He had himself recently examined them; and finding the presence in them of numerous pigment spots, and the complete absence of tracheae, he was quite convinced that they were not tracheal gills. They were, however, structures of a peculiar and very interesting character, for which it was difficult to find anything quite analogous in other families of insects; but he believed their function was merely procryptic, and that they were developed in harmony with other features, to effect the concealment of the insect from its enemies. They were movable, and, looking like diminutive wings, suggested a possible explanation of the use to which the primitive wings were first put in the terrestrial ancestors of the winged insects. That *Cotylosoma* had the habits of other Phasmidae was clearly enough shown by the account MacGillivray had given of *C. carlottae*, a species very closely related to the one described by Wood-Mason. He states that "it was said to be found on the trunks of trees," exactly what we should be led to expect from the description he had given of the colours of the insect—colours that "altogether reminded him of some kinds of lichens." His description of this species, under the name of *Prisopus carlottae*, although published several years before the papers written by Murray and Wood-Mason, was evidently not seen by either of them; nor had they the advantage of seeing fresh specimens in which the original colours of the insects were still retained. Had they been so fortunate as to have seen a specimen like the one passed round that evening,

they might, perhaps, have told a very different story about the habits of the *Prisopi*.

Mr. C. O. Waterhouse observed that he had written the paper to which Mr. Gahan referred for the purpose of throwing doubt on the story of the aquatic habits of the genus *Prisopus*, in which he had no belief.

Leucania pallens and L. favicolor.—Mr. South exhibited a drawer of Leucanid moths captured and reared by the Rev. W. P. Waller in the Woodbridge district of Suffolk. In the first series were three specimens, selected from thirty, that were reared in June 1908 from ova deposited by a female captured at sugar in a marsh near Woodbridge in June 1907. The female parent, also shown, was apparently referable to *L. pallens*, but of her offspring twenty-three specimens were of the typical *favicolor* form, and the other seven were examples of the yellow form of *favicolor*—ab. *lutea*, Tutt. The next series of twenty-four specimens showed the progeny of a female *favicolor* taken in the same marsh, July 1910. The majority of these specimens were not separable from *pallens*, nine were typical *favicolor*, and the others intergrades, but favoured *pallens* more than *favicolor*. In a letter sent with the insects, Mr. Waller, referring to the moths reared in 1911, wrote: "Is it possible this female paired with a male *pallens*?—or have we here a species still in the making, not yet fixed, if I may so express it?" Mr. South observed that seeing that Mr. Waller had reared *favicolor* from eggs laid by a *pallens*-like female, and obtained *pallens* from the ova of a female *favicolor*, the obvious inference was that there was cross-pairing in each case. It was, however, curious to note that although all the moths resulting from the *pallens* ova were of the *favicolor* form, less than half of the moths from *favicolor* ova were of the female parent form.

Turning to the interesting series of *L. pallens* taken at sugar at Waldingfield in the Woodbridge district, it would be seen that some of the specimens comprised therein bore a close resemblance to some forms of *favicolor*. Possibly these particular specimens were hybrids, or perhaps more correctly heterozygotes, and it would seem probable that the *pallens*-like female of Series 1 was also a heterozygote. From the evidence afforded by the material submitted, one

was led to the conclusion that *favicolor* is probably not a true species, but, as Mr. Waller puts the case, "a species still in the making." Mr. South added that he understood that *favicolor* cannot be separated from *pallens* by any difference in the genitalia, and was informed that cross-pairings of *pallens* and *favicolor* are not uncommon in the habitat of the latter. He was, therefore, inclined to suppose that *favicolor* is a salt-marsh development of *pallens*.

A Coleopteron New to Britain.—Mr. Donisthorpe exhibited a specimen of *Eryx fairmairei*, Reiche, a species of Coleoptera new to Britain, one of several taken by him in Sherwood Forest on July 11, 1908. He also showed a French specimen of the same species, and examples of *Eryx atra*, F., the other known British species, for comparison.

Rhopalocera from Lapland.—Mr. W. G. Sheldon showed a collection of Rhopalocera made by him in Jemtland and Swedish Lapland in June and July 1911. The species included were: *Hesperia centaureae*, *H. andromedae*, *Chrysophanus* (*Loweia*) *amphidamas*, var. *obscura*, *C.* (*Rumicia*) *phlaeas*, var. *hypophlaeas*, *Vacciniina optilete*, *Polyommatus icarus*, *Plebeius argyrognomon*, var. *aegidion*, *Pieris napi*, var. *bryoniae*, *Colias nastes*, var. *werdandi*, *Aglais urticae*, and ab. *polaris*, *Brenthis freya*, *B. frigga*, *B. aphirape*, var. *ossianus*, *B. thore*, var. *borealis*, *B. euphrosyne*, *Oeneis norna*, *O. jutta*, *O. bore*, *Erebia lappona*, *E. embla*, *E. ligea*, var. *adyte*.

He also exhibited the following Heterocera taken during the same expedition: *Anthrocera exulans*, var. *vanadis*, *Anarta melaleuca*, *A. cordigera*, *A. melanopa*, *Plusia hochenwarthi*, and others.

Luperina nickerlii and Allies.—Mr. Henry J. Turner exhibited a large number of specimens of *Luperina nickerlii*, of which the British form or race has been hitherto known as *Luperina gueneei*, together with series of other races from the Continent. He called attention to his former exhibit of *gueneei*, and to the notes which he had contributed with Dr. Chapman's aid to the "Entomologists' Record" during the present year, and said that it had been practically proved that *gueneei* was the British form of the Bohemian species *nickerlii*. At the conclusion of his notes he had asked for any information which continental workers might be able to give. As

a result M. Oberthür, with his accustomed kindness, had referred him to his published notes on an allied form which he had named *graslini*, and subsequently had given him a considerable amount of material for comparison and investigation. This material he was exhibiting that evening with the material he had previously possessed, and with a very fine series of the *gueneei* form which he had just received from Mr. Baxter, of St. Anne's-on-Sea.

The conclusions to be drawn from these investigations were—

1. That *nickerlii*, *gueneei*, and *graslini* were one and the same species, which assumption was confirmed by an examination of the genitalia (exhibited).

2. That Guenée erred in 1862 in identifying the Doubleday specimen of *gueneei* with var. A. of his *Luperina testacea*, which latter was undoubtedly a form of *L. testacea*.

3. That var. B. of Guenée's *L. testacea* was *nickerlii*, with which it had originally been identified by Dr. Nickerl himself.

Mr. Turner also called attention to the interesting specimens of *L. testacea* from various continental localities and from Algeria, and of *L. dumerilii* from Rennes and Algeria, which he had received from M. Oberthür.

Erebia aethiops.—Mr. Turner also exhibited a long series of *Erebia aethiops* from many continental localities and also from Aviemore, Scotland. He made the exhibit at the suggestion of Dr. Chapman, with reference to an article in the "Bull. Soc. Ent. France," No. 15, 1911, by M. Roger Verity, in which the Scotch (Galashiels) race of this species was named var. *caledonia*, distinguishing it from the typical Alpine race by its smaller size, its comparatively narrow and longer wings, its narrow fawn-coloured band which does not contain more than three small ocelli (the Alpine race often has four or five), and its underside with the transverse band very often less distinct. Generally speaking, the Scotch specimens exhibited showed these characteristics, being smaller than almost every race placed in the box.

Mr. Turner at the same time called attention to the growing tendency to name aberrations, a course which often resulted in multiple names being bestowed on some one form. In illustration of his remark he instanced the case of the small aberration of *Pieris napi*. In the October number of the

"Entomologists' Record," Mr. Muschamp, of Staefa, had named some very small specimens of this species as ab. *minima*. In the November number of the same magazine M. Lambillion, of Namur, wrote, saying that he had named this aberration in 1902 as ab. *napella*, and about the same time the Baron Crombrugghe, of Brussels, had called it ab. *minor*. While he (Mr. Turner) was afraid it was quite impossible to prevent the naming of aberrations, races, etc., still it was quite possible in his opinion to regulate it. He looked forward to the future power, influence and authority of the International Congress of Entomology, and threw out the suggestion that there should be a permanent international committee chosen by the Congress who should consider each new name proposed, and that no name should be considered valid until it had received the sanction of that committee. If only all the chief magazines and all the principal systematists would support this committee and recognize only the names recommended by them, the multiple naming, which often occurs from mere ignorance, would practically disappear.

Dr. Chapman remarked that local races required special names if any forms did so, and that he had already remarked upon the Scotch form of *E. aethiops*, though without naming it, and had observed that this small form had the genitalia proportionately small, which was very far from being universal in small local races.

A long and important discussion took place on the subject of varietal, and especially aberrational, names, in which the President, Prof. Poulton, Dr. Jordan, and Messrs. Gahan and Wheeler took part; Prof. Poulton remarking that the subject was one on which a discussion might well take place after previous notice, as it was really too important to be dealt with offhand.

Contrasts in Colouring between Certain Species of Butterflies from the Lagos District and their Geographical Races at Entebbe.—Prof. Poulton exhibited a series of specimens bearing upon the view, again recently advanced, that changes of colour and pattern in allied forms are due to climate, and especially to moisture. The western specimens were all collected or bred by Mr. W. A. Lamborn, just above sea-level, in the Lagos district. The Uganda specimens were

collected by Mr. C. A. Wiggins, at about 4000 ft., in the neighbourhood of Entebbe. The average rainfall at Epe, near Mr. Lamborn's locality, Oni, 70 miles east of Lagos, is about equal to that of Entebbe, being 60·5 inches to 59·1. The first example was *Planema epaea*, Cram., and its Uganda sub-species *epaea paragea*, Grose-Smith. In the latter the fuscous ground-colour had been greatly increased, while correspondingly reduced pale-yellowish markings represented the conspicuous fulvous of the western male and white of the western female. Thus the sexual dimorphism of pattern, marked in the west, is lost in the far duller Uganda race. Together with these were exhibited the males and females of *Papilio cynorta*, F., from the same localities. While the males showed no appreciable change, the western female was a beautiful mimic of the female *epaea* and the more eastern female (*peculiaris*, Neave), an equally beautiful mimic of the dingy-looking *paragea*. In this latter case a climatic cause could hardly be invoked, for it is unreasonable to suppose that the male and female larvae and pupae are exposed to different conditions or that they differ in their sensitiveness to climatic influence. It may well be argued, however, that we should not expect a Papilionine and an Acraeine to exhibit the same kind of susceptibility. But even the investigation of other Planemas (*Acraeinae*) at Entebbe does not support the conclusion that the pattern of *paragea* is a climatic effect. Thus it is seen in the exhibited specimens that the rich fulvous and black *P. consanguinea*, Auriv., from the Lagos district becomes the pale yellowish and black sub-species *arenaria*, E. M. Sharpe, at Entebbe.

When we pass from the western to the eastern side of the geographical range, *Planema epaea* becomes a duller, darker-looking butterfly; *Planema consanguinea*, on the contrary, a far lighter and paler butterfly. If, neglecting the immense difference in general appearance, attention be fixed on the fact that the fulvous pigment of the male *epaea* and both sexes of *consanguinea* becomes pale yellow in the east, we are met by the fact that the male *Planema alcinoe*, Feld., from Lagos, preserves the very same fulvous tint unchanged at Entebbe, as do the male *montana*, Butl., form of *P. aganice*, Hew., the male *P. macarista*, E. M. Sharpe, and both sexes of *P. poggei*

nelsoni, Grose-Smith. Further evidence against the hypothesis of climatic influence was derived from Mr. Wiggins's series of *P. paragea*, in which were found the two remarkable specimens exhibited to the meeting. In one of these, a male captured June 26th, 1910, the yellow markings had almost entirely disappeared, while in the other, a female, taken Aug. 29, 1909, they were immensely extended, especially on the hind-wing, where the pale expanse was even two or three times as large as the white area of the female *epaea* from Lagos. Here was a single individual in which the normal change in the eastern part of the range was reversed, the insect being lighter and paler instead of dingier in appearance. Such a variety throws strong light upon the origin of mimetic resemblance; for this pale individual presents considerable likeness to *P. arenaria*, and affords the foundation upon which a close resemblance might be developed by selection. There can hardly be any example as yet known which better enables us to understand the production of mimicry between forms closely allied but superficially very different in appearance: yet in its production the operation of climatic influence is extremely improbable, and we are thrown back upon causes of variation at present unknown and mysterious.

Pseudacraeas of the hobleyi Group on Damba Island as compared with those from the Entebbe District.—Prof. Poulton exhibited a set of the mimetic Pseudacraeas and their models collected by Mr. C. A. Wiggins in the neighbourhood of Entebbe, viz. :—

Planema models.	Pseudacraea mimics.
macarista, E. M. Sharpe, ♂. *poggei nelsoni*, Gr.-Sm., ♂ and ♀.	*hobleyi*, Neave, ♂. Also a ♀ with the colouring of the ♂.
macarista, ♀. *alcinoe*, Feld., ♀. (This model was not exhibited.)	*hobleyi*, ♀.
tellus platyxantha, Jord.	*terra*, Neave. ♂ and ♀.
paragea, Grose-Smith, ♂ and ♀.	*obscura*, Neave, ♂ and ♀. (The ♂ was not exhibited.)

The above series contrasted remarkably with a set of 17 Pseudacraeas collected by Dr. G. D. H. Carpenter on Damba Island, on the Equator, in the Victoria Nyanza, about 20 miles S.E. of Entebbe. Dr. Carpenter wrote of this island on Sept. 30th, 1911: "It is practically covered with forest and jungle formed by the running wild of the banana plantations since the inhabitants were deported to the mainland." The various forms and the times at which they were captured—all except one in the jungle—are shown below :—

DATES IN 1911.	FORMS OF PSEUDACRAEA.
1st half May.	1 ♂ *terra* (typical).
,, ,, July.	1 ♀ *terra* (typical). 1 ♀* *terra* (transitional towards ♀ *hobleyi*: subapical f.w. bar white, and fulvous area reduced and pale. Slight but distinct traces of the fulvous patch at the base of the h.w. underside).
2nd half Aug.	2 ♂ *terra* (typical). 2 ♀ ,, ,, 2 ♀ ,, (slightly transitional towards ♀ *hobleyi*. Subapical f.w. bar pale in one and nearly white in the other).
1st half Sept.	1 ♂ *terra* (typical). 1 ♀ ,, ,, 2 ♂ *hobleyi* (1 typical, 1 with h.w. bar fulvous instead of white).
2nd half Sept. (17th–30th.)	1 ♀ *hobleyi* (typical). 1 ♀ *terra* (beautifully transitional to *obscura*). 1 ♂ *obscura* (with distinct traces of the fulvous colouring of *terra* on f.w. inner margin). 1 ♀ *obscura* (subapical f.w. bar white as in ♀ *hobleyi*, but narrower, and the remaining white pattern of the latter *very faintly* visible.

1. Proportions of the Mimetic Forms and of the Models.—The proportions in the Entebbe District are well shown by the following figures, which summarise nearly

* This specimen was captured on the shore.

the whole of this material collected by Mr. Wiggins between May 23rd and Aug. 31st, 1909.* :—

PLANEMA MODELS.	PSEUDACRAEA MIMICS.
macarista ♂ ... 81 *poggei nelsoni* ♂, 11 ,, ,, ♀, 1 93	*hobleyi* ♂, ... 35 ,, ♀ (with ♂ colours) 1 36 (38·7 per cent. of the models).
macarista ♀, 39 *alcinoe* ♀, 11 50	*hobleyi* ♀, 28 (56·0 per cent. of the models).
tellus platyxantha ♂, 75 ,, ,, ♀, 14 89	*terra* ♂, 7 ,, ♀, 11 18 (20·2 per cent of the models).
epaea paragea, 12	*obscura*, 0

The percentage of the three commonest mimics is thus much higher than we should expect; but on Damba Island, so far as could be judged from Dr. Carpenter's collections between the beginning of May and the end of September, the results are far more astonishing. The only *Planema* models in the whole collection are a single female *macarista* and a single female *poggei nelsoni* in the second half of August, and a single male *macarista* captured on Aug. 8–9. All these specimens were taken in the jungle. In spite of the immense predominance of *P. terra*, not a single *Planema tellus platyxantha* appeared in the collection, nor was there a single *P. epaea paragea*. Even more striking was the absence of *P. arenaria*, by far the most abundant *Planema* in the forests near Entebbe.†

* Quoted from "Mem. I. Congr. Internat. d'Ent., Brussels," Vol. II, p. 483, 1910. This paper contains a nearly complete list of captures, between the above-mentioned dates, of all the species concerned, except *Planema paragea* and *Pseudacraca obscura*. The proportions of these two latter were taken from a list recently prepared by Mr. C. A. Wiggins and Prof. Poulton. In the course of this work it was found that one or two days' captures had been accidentally omitted from the paper referred to above.

† The results quoted above are not due to the captor's selection, and, so far as the limited numbers go, may be depended upon in attempting to form an estimate of the proportion of models and mimics in the jungle. This was Dr. Carpenter's first experience of these extraordinarily close

Not only is there this extraordinary difference in the proportions of the models, but the proportions of the mimetic forms to one another are also remarkably different from those of the mainland, *terra* being far more predominant over *hobleyi* in the island than *hobleyi* is over *terra* on the mainland.

2. Proportion of Transitional Forms between the Mimetic Pseudacraeas Higher on the Island than on the Mainland.—The table on p. xcii. shows a quite unusual number of transitional forms. Transition is indicated in various directions,—between *terra* and *obscura*, between *terra* and ♀ *hobleyi*, between *terra* and ♂ *hobleyi*, between *obscura* and ♀ *hobleyi*.

3. Possible Causes of the Above Differences.—It is highly improbable that these remarkable differences are connected with climate or season of the year; for the contrasted sets of captures were made in almost the same months. The period was, moreover, long enough to exclude the effects of the seasons beginning and ending on different dates in different years. The most probable explanation appears to be that, in the condition of the jungle on Damba Island, there is something unfavourable to Planemas, and that, in the absence or relative scarcity of the models, the mimetic resemblance of the Pseudacraeas is no longer rigidly maintained by selection. The pattern of *Ps. terra* is found among the protean mimetic forms of *eurytus*, L., on the west coast, and even the colour as well as the pattern in a Nigerian mimic of the male *Pl. epaea*.* I suggest that in an area where these mimetic patterns are less strongly selected, there is a tendency, checked elsewhere, for them to run into each other, and also to move in the direction of the western *eurytus* forms, from which there can be little doubt that the mimetic Pseudacraeas of Uganda originally developed. It is to be hoped that Dr. Carpenter may be able

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mimics, and he had not at the time learnt to distinguish them from their models. He states in a letter dated Dec. 5th, 1911: "I was much surprised to hear that I had sent more Pseudacraeas than Planemas, and thought I had done the opposite."—E. B. P.

* Figured by Dr. Karl Jordan in the publication of "I. Congr. Internat. d'Ent.," 1910, Vol. II, pl. xxii, fig. 22*a*. Good examples of pattern but not colour resemblance are shown in his pl. xxiii, figs. 26*a*, 27*a*.

to obtain the material, by breeding as well as by capture, by which this hypothesis will be confirmed or refuted.

Observations on the Courtship of Planema alcinoe, Feld.—Prof. Poulton exhibited four males and one female of *Planema alcinoe*, captured Aug. 10th, 1911, in the forest one mile E. of Oni, near Lagos, by Mr. W. A. Lamborn, under the conditions described by him in the next paragraph, dated Aug. 13th. Prof. Poulton said that he was not aware of similar observations having been made upon Lepidoptera, in which group the unsuccessful males have often been seen to disperse as soon as pairing takes place. It is to be noted that in a family of *P. alcinoe* bred by Mr. Lamborn the males emerged Sept. 8th–11th, 1911, the females not until Sept. 16th–22nd.

"I found five Planemas in a confused mass on a thin bough. Careful examination revealed that four were males and one a female. A male and female were *in coitu*, both resting on the upper side of the little bough facing opposite ways; another male rested underneath, his head in the same direction as that of the female. His claspers gripped her abdomen immediately in front of the claspers of his more successful rival, the penis of No. 2 being extruded and forced to one side. A 3rd male grasped a wing of the female so firmly with his legs that the membrane was crumpled up: he remained motionless. The 4th male grasped and crumpled up the opposite wing in a similar way, all the time making efforts to obtain hold of any portion at all of her anatomy with his claspers."

The Cocoons and Eggs of the Bombycid Moth, Norasuma kolga, Druce.—Prof. Poulton exhibited the cocoon of *N. kolga* together with the moth which had emerged from it. The compact cocoon itself was reddish, with an outer imperfect covering of yellow silk. In some cocoons, including the one exhibited, the silk of this loose and open network formed dense little masses here and there which, being bright yellow in colour, much resembled the cocoons of Braconid parasites. Prof. Poulton had written to Mr. Lamborn to inquire whether these structures were always present in the natural state, as it seemed possible that the loose covering had been lost in

the manipulation of some of the artificially bred specimens. Prof. Poulton also exhibited a wall-like mass of egg-shells in which the arrangement to "break joint," as described by Mr. Lamborn, was clearly visible. This keen observer had written, Aug. 28th, 1911—

"You will see, by egg-shells now sent, how wonderfully the eggs are disposed—in the form of a little wall, the eggs being in rows one above the other and each egg placed so as to cover the adjacent halves of two eggs below it. There is a fine opalescence too about the egg mass in a good light."

These specimens together with the remainder of those exhibited by Prof. Poulton were obtained by Mr. Lamborn at, or near, Oni Camp.

The Spherical Bodies on the Cocoons of the Hypsid Moth Deilemera antinorii, Oberth., etc.—Prof. Poulton exhibited a large family of these moths—80 in number—together with their female parent, and 67 of the cocoons from which they had emerged. The exhibit had been recently received from Mr. W. A. Lamborn, who had bred the moths from eggs laid Aug. 13–18, 1911. Concerning the habits of the larva Mr. Lamborn had written, Sept. 19th—

"In regard to the structures like Braconid cocoons I do not think there is much to add to what I have already written. The larva spins a few threads in the usual way. The hinder extremity of the body is gradually raised until it is brought to about an angle of 20° with the rest of the body, the larva meanwhile continuing to spin. When it has been in this position a few seconds the little mass is passed *per anum*, the larva ceasing work only during the actual passing of it. When several little masses have accumulated, the larva turns round, weaves silk over each and in turn drags each off by the silk and deposits it in the desired position."

In reply to further questions as to the details of the larval procedure Mr. Lamborn wrote, Nov. 12th—

"In regard to the cocoons of *Deilemera antinorii* the larva passes spheres *per anum* usually one at a time with an interval of perhaps half a minute between them. Sometimes two are passed, one following immediately on the other. When two or three spheres have accumulated at its anal extremity the

larva turns round, weaves a few turns of silk round one and drags it away to the required position, I believe by means of these silk threads. It then fixes it by a few further turns of silk, and then removes the remaining spheres one by one in a similar way. The silk spun over the spheres is white. The spheres vary in colour even when first passed, some being yellowish and often containing one or two bubbles darker than the rest, others being much paler. I think that the latter darken with age. The time occupied in spinning over a single sphere is just a few seconds, and I think the silk serves as a handle. I have not observed the whole process of cocoon formation, for it takes some hours, the larvae frequently commencing at night, and I have not seen the final stages at all, but I shall look into the various points you mention."

Concerning the cocoon of the allied southern and eastern species of *Deilemera*,—*D. leuconoe*, Hopff., Mr. G. F. Leigh had written to Prof. Poulton on Oct. 27th, 1911—

"I noticed what you say about the cocoon, and, in a short discussion some years ago at the Durban Field Naturalists' Society, I pointed out this very thing; for when I first bred this species I actually threw away three or four cocoons of the first lot, thinking that ichneumonid parasites had emerged from the larvae. I have bred hundreds of the insects, of which there are two forms of imago, one black-and-white, the other black-and-buff. The larva is black-and-white, slightly hairy, as may be seen in blown specimens sent by me to the British Museum and Tring Museum. It feeds on a low plant, but always climbs up on to a fence, wall or trunk of a tree to make its cocoon. The larva is protected and distasteful to birds, Mantis, etc. The cocoon is formed of a substance very much like jelly, which, as long as the pupa is alive remains soft; if, however, the pupa dies the substance becomes dry and shrinks also. The pupae will live if the substance that forms the cocoon is taken off. The colour of the pupa is light brown. The cocoon-like bodies vary in tint, but are generally yellow, although I have had them white like very small pieces of boiled rice. The duration of the pupal state is very short, not more than a week. The larva is attacked by an ichneumon of apparently the same species as that which is

bred from the three Papilios, *demodocus*, Esp., *niveus*, L., and *cenea*, Stoll. The parasitic larva, after leaving the host, spins a thread almost $1\frac{1}{2}$ inches long, attached by one end to the twig of a tree or to a wall. At the lower end of this thread it constructs a parti-coloured cocoon—grey-and-black. There is another species of *Deilemera* I found in the Comoros that makes its cocoon in the same way. I fancy it feeds there on the small fig-trees, as I found the pupae only on those trees."

The Spherical Bodies on the Cocoons of the Tineid Genus Marmara.—Prof. Poulton said that he had been shown by Mr. J. H. Durrant the spherical bodies scattered over the cocoon of the Tineid moth *Marmara salictella*, Clemens, and had no doubt that they were secreted by the larva and passed by the anus as in *Deilemera*. It would be interesting to observe whether any of the common parasites of Tineids construct cocoons to which the spheres bear any marked resemblance. At first sight the appearance suggested is rather that of a mass of spiders' eggs such as are often seen in chinks of bark. Here, too, it is important to ascertain by experiment whether spiders' eggs are in any way specially protected.

Although the Tineid spheres are much smaller than those of *Deilemera*, each of them is similarly made up of several bubbles, and the resemblance is so remarkably close that it is appropriate to quote in this place the observations that have been hitherto recorded concerning them. The references to *Marmara* have been kindly given by Mr. Durrant.

Clemens wrote of *M. salictella* in 1863 ("Ent. Soc. Phila.," ii, p. 7; reprinted in Stainton's ed. of Clemens' papers on "Tin. of N. Am.," 1872, p. 212)—

"It leaves its mine at maturity to weave a white, semi-transparent cocoon within some crevice of the bark of the tree on which it feeds or upon the ground. The exterior of the cocoon is covered with little froth-like globules, which resemble minute pearls."

Busck wrote of the same species in 1903 ("Proc. Ent. Soc. Wash.," v, p. 210)—

"The writer has bred it for several seasons, and gave some notes before the Washington Ent. Soc., on its unique mode

of ornamenting its cocoon, which deserves fuller treatment. Such will be given shortly in a separate paper."

Finally in 1907 Busck stated of *Marmara opuntiella*, Busck (in "Ent. Soc. Wash.," viii, p. 97)—

"At the last larval molt it assumes the cylindrical form with normal legs and spins the characteristic cocoon with the peculiar globular ornamentations as do the other species of the genus."

The Attacks of Tachinid Flies upon the African Danaine Genus Amauris.—Prof. Poulton exhibited 5 specimens of *Amauris psyttalea*, Plötz, being all that Mr. W. A. Lamborn "obtained from 25 pupae, the rest being parasitized by *Tachinidae*" (Oct. 3rd, 1911). All 5 butterflies had emerged Sept. 20th, 1911. Seventeen dead pupae from the same company, 12 of the Tachinid flies, and a number of their puparia were also exhibited. Mr. E. E. Austen had recognized 2 species of *Sturmia* in 4 of the flies submitted to him. In the same letter Mr. Lamborn spoke of another company of *A. psyttalea* in which "every single pupa was parasitized in this way." Prof. Poulton pointed out the bearing of these and Mr. Guy Marshall's earlier observations on the extraordinary assumption of the late Erich Haase, that the specially protected species of Lepidoptera are immune from the attacks of parasites.

Some Ant-tended Lycaenid Larvae observed by Mr. W. A. Lamborn in the Lagos District.—Prof. Poulton exhibited material illustrating the following records received in letters from Mr. Lamborn—

1.—*Myrina silenus*, F.

March 3rd, 1911.

"The food-plant, which bears a fruit much like a little fig, grows here and there in the primitive forest round Oni camp. The larva of *Euchromia lethe*, F., also feeds upon it, as well as that of a Sphingid moth. The larvae are green with white tubercles and are not very conspicuous on the food-plant, though found in all positions on it, on both sides of the leaves and frequently on growing buds at the end of stems. They pupate anywhere; frequently on the upper side of a leaf. It

is very common to find the larvae attended by ants of various kinds, which run all over them, and the larvae do not notice them in the least even when feeding. The pupae also seem to attract ants."

2.—*Hypolycaena philippus*, F.

March 3rd, 1911.

" The larvae of all these have been found all round about Oni camp; for the food-plant grows abundantly in the clearing. The larvae are found sometimes on the upper side of a leaf even during the heat of the day, and they are leaf-green in colour. Both larvae and pupae attract ants to a remarkable degree. I have learnt that if ants are running about on the food-plant without flowers, larvae are almost certainly on it, and if there are no ants I do not trouble to make an exhaustive search. My first half-dozen larvae were placed in a box covered with fine muslin. On the following morning I discovered that our house ants, a different species from those on the plants, had eaten a hole in the muslin and were swarming over the larvae. I then put two thicknesses of muslin over the box, but the ants again ate it through, and so now, as they do not seem to hurt the larvae, I do not trouble to remove them. The pupae are placed indifferently on upper or under side of a leaf and frequently head downwards on a stem, and ants congregate about them during the whole period of pupation. The ants work hard in an endeavour apparently to cover up the pupae with débris. They heap up little particles of sawdust, larval droppings, etc., round pupae on the floor of the box, and some attempt is even made to cover the pupae on the side walls. I found today on the outside of the roof of the box a little collection of débris with which ants were busily covering a fissure in the wood which led through to a pupa on the inner side of the roof. Some larvae have pupated on the floor of the box, but this does not affect the wing-development of the butterflies, for they always seem to find a suitable position in time. I have from time to time lost other butterflies which have not been able to develop properly owing to their pupae having fallen down. By the way, the larvae are usually green, but

I now have a scarlet one of, I believe, the same species. The pupae are sometimes green and sometimes perfectly grey-coloured."

3.—*Oboronia punctata*, Dew.

The observations on this remarkable species are of special interest—

Sept. 10*th*, 1911.

"I made a little discovery to-day which has much delighted me. In accordance with your suggestion I have been investigating the contents of ants' nests and to-day found two Lycaenid larvae. I must write about this when I get perfect insects. The particular nest of ants was constructed on the head of a plant [*Costus afer*] which had borne numerous bell-shaped flowers. These were eaten down more or less level, and then the ants had piled up earthy-looking vegetable débris over the mouths of the remaining parts of the flowers. I found the larvae each thus sealed up loosely in the base of what had been a flower. I removed the débris and carefully brought the flower-head home, and the ants are now again moving quietly to and fro on it. I think these larvae may be Oboronias, for these are the flowers which seem to have a special attraction for them, as I think I have mentioned."

Sept. 19*th*, 1911.

"You will have received my first *Oboronia punctata* from a pupa. This was found in the calyx of one of the flowers which I have mentioned, the opening of which was sealed by débris deposited by ants. I will not attempt to describe the flowering head, for I intend to send one; but, roughly, there are a number of bell-shaped flowers springing from a common dome-shaped base. Only one or two of the flowers come into bloom at once, and over the other immature buds ants build up a covering of the débris, themselves occupying the interstices between the buds and keeping their larvae and eggs there. I have now found several *Oboronia* larvae, some with the ants in the interstices, and others in calices from which the flowers have fallen out or the flower-buds been eaten away.

The larva feeds on the flower-buds, biting out a circular aperture through the calyx, by which it obtains ingress, and gradually eating the bud out till only the empty calyx remains. The ants, too, enter with the larva and crawl all over it, stroking it with their antennae, and they are very constant in their attentions to the pupa too, several always remaining with it, though the calyx which contained it was put away without anything else in a glass-lidded box. Some of the ants' nests contain a large number of individuals, and I have not been able to look them through satisfactorily as yet, but I have obtained 6 larvae out of 7 nests, 2 nests having 2 larvae apiece. I must get some help before I can explore any more, as the ants bite, and I do not want to cut off the flower-heads, as there are not a great number. I am trying now to get a family of Oboronias, but it is likely to be difficult, as the food-plant dies so soon. I think this plant must be that determined at Kew as *Costus afer*, Ker.-Gawl (*Scitamineae*), a specimen being sent home in the first consignment of plants."

The flower-head was sent to Kew and determined as *C. afer*, *sens. lat.*

The next letter (Oct. 3rd, 1911) gave an account of Mr. Lamborn's attempt—in all probability a successful one—to breed Oboronias from a known parent—

"I believe the Oboronias now sent to be the offspring of the female whose remains are packed with them. She was eaten by the ants. With a view to obtaining a family of them I selected a good head of the food-plant in our clearing at Oni, and cleared it of all ants and their débris, removing at the same time all dead matter. I went over it again the next day, and the following morning I pushed it through a hole in the floor of a box, closing up all the space round it with cotton-wool. I then put the *Oboronia* female inside and covered the box with muslin in front. In the course of a couple of days the ants got in and formed a nest composed of sawdust, etc., over the flowering head. The butterfly died and was mostly eaten up by the ants. I was not able to look for eggs or larvae, but when I did pick the flowering head to pieces I found a few pupae which I feel confident must have been the progeny of that insect."

The following observations, recorded in the same letter, show that all ants are not equally benevolent in their treatment of the Oboronias—

"On Oct. 5th I obtained a half-grown larva of *Oboronia punctata* and placed it on a stem on which 'tree driver' ants [evidently *Oecophylla smaragdina*, F., race *longinoda*, Latr.] were running up and down. The first driver that came along investigated it hurriedly with his antennae and then gripped its anal extremity in his jaws and held on. More ants came down. Some passed on without noticing the larva, others just touched it with their antennae and then went on. Seven or eight thus passed it by, and the next ant stood over its hind extremity and discovered on the dorsal aspect of, I think, the second segment some material which it ate. I actually saw it take up the semi-solid material and eat it. This ant then ran off. The larva meanwhile had been endeavouring to crawl away, but it was firmly anchored to one place by the ant which had seized it. Another ant then came along and seized it by the head and dragged so that it became much extended. Two more ants then seized it at the sides. At this point I was obliged to come away; but they must have killed the larva, for it was very feeble when I last saw it, and they doubtless ate it."

This uncompromising treatment of the larva of *O. punctata* is all the more interesting because W. M. Wheeler ("Ants, their Structure, Development and Behavior," New York, 1910, p. 358) speaks "especially" of *Œ. smaragdina*, when mentioning the "principal attendants" of Lycaenid larvae. This distinguished authority continues:—

"*Œ. smaragdina* in that country [India] and in Australia, is, in fact, constantly found with many species of the caterpillars and often keeps them in the silken nests and 'cow-sheds' described in a previous chapter."

A postscript, dated Oct. 9th, to the letter last quoted, records that "a moth larva also lives on the *Oboronia* plant among the ants. An imago has just come out." Mr. Lamborn furthermore states that the ants pay no attention to these larvae, which are probably protected against them in some way. Examples of the moth, the Pyralid (*Schoenobiinae*)

Obtusipalpis saltusalis, Schaus, were exhibited with the Oboronias and the flower-head.

4 *and* 5.—*Lycaenesthes larydas*, Cram., *f. kersteni*, Gerst., *and L. sylvanus*, Drury.

Bred examples of these two species were also shown. Mr. Lamborn had recorded, Oct. 16th, 1911, of ten larvae of *larydas*—of which only a single specimen survived and produced, on Oct. 10th, the exhibited imago—that they had been "carefully attended by ants." Of the two *sylvanus*, emerging Oct. 11th and 12th, he had written in the same letter, "these larvae also were attended by ants: in fact, the presence of a considerable number of ants attracted my attention to them."

Prof. Poulton said that he had written to Mr. Lamborn, asking him to send specimens of the actual ants in attendance on each species of Lycaenid larva, as their determination would add immensely to the value of these most interesting observations.

The Food of the Carnivorous Lycaenid larva, Spalgis lemolea, H. H. Druce (S-signata, Holland).—Prof. Poulton exhibited specimens and gave an account of observations sent by Mr. Lamborn, which threw further light on the letter written Jan. 1891, by the Rev. A. C. Good, Ph.D., from West Africa—a letter from which Dr. W. J. Holland had inferred that the larvae of *S. lemolea* are aphidivorous ("Psyche," vol. vi, 1892, p. 201). The following extracts from Mr. Lamborn's letters, together with an investigation of his material, indicate that their food consists of *Coccidae*.

"*Sept.* 17*th*, 1911.

"I have now found another kind of Lycaenid larva, perhaps *Spalgis lemolea*, consorting with aphides or tiny *Coccidae*."

"*Sept.* 9*th*.

"My newest Lycaenid larvae were found on Sunday afternoon, Sept. 17th, associated on the under side of leaves with other insects which I believe to be Coccids. I must write of

them when the butterflies emerge, but I believe they will turn out to be *Spalgis lemolea*, H. H. Druce, for I have seen several of these near the tree in the clearing, and have not made out why they come there in the face of a strong breeze which is now blowing almost constantly."

"*Oct. 3rd.*

"All the larvae were found among Coccids on a shrub in Oni clearing. I will send Coccids. Each larva bore a covering of grey material, which looked to me as if composed of cast skins of Coccids; and I think they must have eaten these or their products, for they did not eat leaves. I am told that the plant they were on is a species of *Croton*, but I rather doubt it. The larvae were all found on the under side of leaves, and always among the Coccids."

Rev. A. C. Good, in the letter referred to above, described these Lycaenid larvae as follows: "The body was all covered over with a whitish substance, not a part of the body, and which I took to be the remains of plant-lice with which the underside of the leaves on which the larvae were found abounded. I think that these caterpillars must have fed upon these white plant-lice, for I could not detect that they had eaten the leaves" (*l. c.*, p. 202).

One of the larval skins sent by Mr. Lamborn has been examined by Mr. R. S. Bagnall, who finds that the grey material is "mostly composed of what I presume to be the 'woolly' excretion of a Coccid, but also contains the remains of an insect which I regard as a Coccid—chiefly on account of the short antennal joints, short tibia and single-jointed claw."

Prof. R. Newstead, who has examined Mr. Bagnall's preparations, wrote on Jan. 10, 1912—

"The remains in part (portions of detached legs and antennae) are undoubtedly those of a species of *Coccidae* belonging, I believe, to the *Dactylopiinae* and nearly related to one of the following genera: *Dactylopius*, Targ., *Pseudococcus*, Sign., or *Eriococcus*, Targ. The numerous long hairs attached to the fragments of skin are, however, quite unlike those of any species of Coccid with which I am familiar; indeed, they

seem to be quite unique, and may belong to a totally different insect."

Dr. K. Jordan remarked that it was quite surprising that Prof. Poulton's correspondents in Uganda got so many specimens of *Pseudacraea* while that genus is generally scantily represented by individuals in West African collections. He further observed that among the specimens exhibited were some intermediates, which supported his contention that *obscura, terra* and others are only forms of one species.

Brazilian Syntomids.—Mr. W. J. Kaye exhibited a drawer full of *Syntomidae* that had been collected by himself in S. Brazil in the early part of 1910. Allusion was made to the richness in some localities, numerically as well as in species, of this family which is very specially developed in S. America. It was pointed out that there were certain types of coloration which recurred in widely different and not closely related species. Instance was made of *Mesolasia paula* and *Dinia aeagrus*, which although found in the same district did not fly together, and moreover had a very different flight one from the other. Similarly *Macrocneme leucostigma* was like *Antichloris eriphia*, yet there was no confusing the two in the field. A more remarkable case was *Callopepla inachia* ♀, which was extremely like an Oenochromine moth, *Scea flammea*. These insects had, however, very different habits. The Syntomid flew and settled on a creeper in the early morning in the full sun, while the Oenochromid flew slowly in very shady woods. The former was rapid in its movements and the latter was very slow. It was hard to believe that this was not a case of mimicry, for a bird could, of course, fly in the open as well as in the forest and see the two insects in pretty quick succession. When settled the two insects were very alike, although in flight they were so different. Such closeness of resemblance when the two insects did not occur together was noteworthy and points to either a great difference in edibility or in the numerical ratio of the one to the other. At the Alto da Serra two species of *Euagra*, *E. azurea* and *E. splendida* were always together. It was curious that *E. splendida* should not belong to the genus *Agyrta*, as in Guiana two exactly similar

species, *Euagra coelestina* and *Agyrta micilia*, belonged to different genera and there the two were always in company. On neuration there was no doubt as to the position of *splendida* being in the genus *Euagra* as placed by Sir G. Hampson.

Appended is a list of the species exhibited—

Tipulodes ima, Bdv., taken March 1st; *Loxophlebia fininigra*, Kaye, April 17th; *Trichura grandis*, Kaye, Feb. 27th; *Trichura dixanthia*, Hmps., *Cosmosoma elegans*, Butl., March 2nd; *Cosmosoma xanthistis*, Hmps., March 1st; *Napata eucyane*, Feld., March 2nd; *Agyrta dux*, Wlk., March 1st; *Dinia aeagrus*, Cram., Feb. 27th; *Dixophlebia quadristrigata*, March 1st; *Mesolasia paula*, Schs., March 2nd; *Saurita tenuis*, Butl., March 1st; *Mallodeta sanguipuncta*, Druce, March 2nd; *Saurita melanifera*, Kaye, March 2nd, all at Guaruja. *Saurita intricata*, Wlk., Feb. 20th; *Isanthrene pertyi*, H. S., Feb. 18th; *Neotrichura nigripes*, Heyl., Feb. 21st; *Chrysostola dycladioides*, Heyl., Feb. 18th; *Teucer subplena*, Wlk., Feb. 19th; *Correbia lycoides*, Wlk., Feb. 17th; *Dycladia lucetius*, Stoll., Feb. 16th, all at Rio. *Coreura atavia*, Hmps., March 6th; *Euagra azurea*, Wlk., *Euagra splendida*, Butl., Feb. 23–March 6th; *Leucotmemis bella*, Kaye, March 6th; *Callopepla emarginata*, Wlk., Feb. 23rd; *Cosmosoma pheres*, Cram., March 6th; *Napata splendida*, H. S., March 2nd; *Pseudosphex jonesi*, Kaye, March 6th; *Mesothen perflava*, Kaye, Feb. 23rd; *Pheia haemapera*, Schs., March 3rd; *Leucotmemis pleuraemata*, Hmps., March 3rd; *Argyroeides ophion*, Wlk., March 5th; *Nyridela chalciope*, Hüb., March 4th; *Amycles dolosa*, Wlk., March 6th; *Cosmosoma hanga*, H. S., March 2nd, all at Alto da Serra. *Argyroeides sanguinea*, April 12th; *Chrysostola variegata*, Kaye, April 12th; *Pseudosphex noverca*, Schs., April 12th; *Cyanopepla orbona*, Druce, April 4th–12th; *Callopepla inachia*, Schs., April 4th–12th; *Cyanopepla jucunda*, Wlk., April 4th–12th; *Napata castra*, Hmps., April 4th–12th; *Eurota hermione*, Berg., April 10th; *Pseudosphex polybioides*, Burm., April 13th; *Mesolasia melanobasis*, Druce, April 2nd–14th, at Fernandes Pinheiro. *Macrocneme leucostigma*, Perty, March 7th–11th; *Cosmosoma plutona*, Schs., March 11th; *Ctenucha*

divisa, Wlk., March 11th, at Castro. *Eucereon latifascia*, Wlk., Feb. 16th, at Rio. *Paraethria triseriata*, H. S., April 14th, at Castro. *Phoenicoprocta teda*, Wlk., March 27th, at Guaruja.

Papers.

The following additional note, to accompany an illustration of *Mymar regalis* (*v.* p. xxvii.) was communicated—

Description of a new species of the Hymenopterous genus *Mymar*.

By Fred. Enock, F.L.S., F.E.S.

At a recent meeting of this Society I exhibited a specimen of a new species of the genus *Mymar*, which I proposed to call *Mymar regalis*. Since then I have been fortunate enough to secure other examples of both sexes. This enables me now to give a fuller description of the species.

Mymar regalis, Enock. (Plate A., ♂, ♀.)

Pale rusty yellow, shining. Head slightly darker, the eyes and frontal ridge black. Abdomen slightly darker than the thorax, with the apical third nearly black. Hind wing thread-like, two-thirds the length of the front wing, slightly widened at the apex; legs paler than the thorax, the apical joint of the tarsi brown.

♂. First and second joints of the antennae yellow, the rest brown. Apex of the hind wing with five or six long ciliae.

♀. First and second joints of the antennae rusty yellow, the third and fourth dark brown, the fifth lighter, the sixth, seventh and eighth almost yellow, the club dark brown, appearing almost black.

Length ·8 mm.

Hab. Burnham Beeches, Buckinghamshire.

The most manifest difference between this species and *M. pulchellus* is the length of the hind wing, which instead of stopping where the hooklets join the front wing, is prolonged for about two-thirds the length of the front wing. The dilated apical portion of the front wing is slightly

different in form, and is surrounded by about fifty to sixty hairs, whereas in *M. pulchellus* there are only about thirty-five. The hind wing of the male has five or six ciliae at the apex: the female has only two or three.

The first specimen was taken by myself when sweeping grass on June 3rd, as already recorded (p. xxvii). On the 8th and 21st I captured three other examples: and having taken home some roots of grass from the spot where I took them, I succeeded in obtaining during July both sexes.

Two females emerged on July 31st.

Mr. Waterhouse captured a male on July 3rd.

The following papers were also read—

"On the *nictitans* Group of the genus *Hydroecia*, Gn.," by the Rev. C. R. N. Burrows.

"On the Dates of the Publications of the Entomological Society," by the Rev. G. Wheeler, M.A., F.Z.S.

Vote of Thanks.

Mr. Wheeler mentioned the great amount of gratuitous help which had been given to him in the matter of these dates by Messrs. Taylor & Francis, Mr. C. F. Roworth, Messrs. West, Newman & Co., and above all by Messrs. Longmans, Green & Co., who had given him the dates on which they had received every part of every volume from 1834 to 1911. He proposed a vote of thanks to each of these firms, which was seconded by Mr. J. H. Durrant, and carried unanimously.

Notices.

The President said he had received a letter from Mr. T. H. L. Grosvenor, stating that Colley Hill, Reigate, a famous entomological and botanical locality, would come into the hands of the speculative builder in February next unless it were previously purchased by the "National Trust," in order to preserve it, and asking for subscriptions from one shilling upwards. He added that the Treasurer would willingly receive any subscriptions that the Fellows present liked to give, and would hand them over to the proper quarter.

The President further reminded the Society of the Second

International Congress which is to take place at Oxford this year from August 5th to 10th. He hoped that the Society would be strongly represented.

He also stated that after consultation it was hoped that the dinner at the Holborn Restaurant, on the evening before the Annual General Meeting, which the late Mr. Verrall had for so many years generously given, might be able to be carried on, and announced that it would take place on January 16th, the hosts on this occasion being himself and certain other Entomologists who had subscribed for the purpose.

♀

C. Hentschel.

Fred. Enock, Photo.

Mymar regalis.

ANNUAL MEETING.

Wednesday, January 17th, 1912.

The Rev. F. D. Morice, M.A., President, in the Chair.

Mr. R. Wylie Lloyd, one of the Auditors, read the Treasurer's Balance Sheet, showing a balance in favour of the Society of £32 10*s.* 11*d.* On the proposal of Mr. O. E. Janson, seconded by Mr. W. J. Lucas, it was adopted unanimously.

The following Report of the Council was then read by the Rev. George Wheeler, one of the Secretaries :—

Report of the Council.

During the Session 1911–12 two of our Honorary Fellows have died, namely, Mr. P. C. T. Snellen, of Rotterdam, and Dr. S. H. Scudder of Cambridge, Mass., U.S.A. ; these vacancies were filled by the election of Fr. Erich Wasmann of Valkenburg, Holland, and Prof. J. H. Comstock of Cornell University, U.S.A. The number of Ordinary Fellows elected, (thirty-four), is smaller than last year, but our losses from all sources are considerably below the average: seven Fellows have resigned, three names only have been removed from the list for non-payment of subscription, while one which had been removed has been replaced, and the following eight Fellows have died : M. Jules Bourgeois, Mr. Alex. H. Clarke, the Rev. Canon C. T. Cruttwell, Mr. Albert Harrison, Mr. W. A. Rollason, Mr. Oscar Silverlock, Mr. F. W. Terry, and Mr. G. H. Verrall. In addition to these we have received information during this year of the death of another of our Fellows, Dr. E. C. Reed, Director of the Museum at Concepcion, Chile, which took place before the end of last session ; our losses therefore number twenty-one in all, and the additions to our Society thirty-seven, bringing our roll to a total of five hundred and

seventy-seven, again a record number, consisting of twelve Honorary and five hundred and sixty-five ordinary Fellows.

The Transactions of the Society for 1911 form a volume of seven hundred and sixty-seven pages, containing thirty-four memoirs by the following authors: Prof. C. Aurivillius, A. Bacot, Prof. Mario Bezzi, the late Col. C. T. Bingham, Henri Boileau, Miss E. Bridges, Malcolm Burr, D.Sc., F.L.S., F.Z.S., Rev. C. R. N. Burrows, T. A. Chapman, M.D., F.Z.S. (four), E. A. Cockayne, F.L.S., W. C. Crawley (part author of one paper with H. St. J. K. Donisthorpe) (two), W. L. Distant, F. P. Dodd, H. St. J. K. Donisthorpe (part author of one paper with W. C. Crawley) (two), Hamilton H. C. J. Druce, F.Z.S., Ernest Elliott, F.Z.S. (joint author with Claude Morley F.Z.S.), H. Eltringham, M.A., F.Z.S., Miss Margaret Fountaine, Sir George Kenrick, Bart., Percy I. Lathy (joint author of a paper with W. F. H. Rosenberg, F.Z.S.), Lieut.-Col. Neville Manders, R.A.M.C., F.Z.S., Edward Meyrick, B.A., F.R.S., F.Z.S., Rev. Francis David Morice, M.A. (part author with the late Edward Saunders, F.R.S.), L. W. Newman, R. C. L. Perkins, M.A., D.Sc., F.Z.S. (two), Harold Powell, Prof. O. M. Reuter (joint author with B. Poppius), Rev. George Wheeler, M.A., F.Z.S., and A. E. Wileman. Of these eighteen refer to Lepidoptera, seven to Hymenoptera, three to Hemiptera, one each to Coleoptera, Dermaptera and Diptera, and three are of general entomological interest.

These papers are illustrated by 58 plates, consisting of 12 chromo-plates, 3 three-colour plates, 2 black lithographs, 3 line-blocks and 38 half-tone blocks. The entire cost of 4 of the chromo-plates (£54) was borne by Sir George Kenrick, and half the cost of another by Dr. Chapman, who also gave the original drawings and blocks for 35 of the half-tone plates; Mr. Eltringham gave the drawings for one chromo-plate and for one of the lithographs, M. Boileau those for one of the three-colour plates and one of the line-blocks, Messrs. Reuter and Poppius those for another of the three-colour plates, and Dr. Burr those for the other two line-blocks. In addition to these the Proceedings contain one half-tone plate, the original of which was given by Mr. F. Enock. The Proceedings occupy one hundred and ten pages, and contain a large

amount of valuable information connected with the exhibits at the meetings, in addition to several short papers of interest.

The attendance at the Ordinary Meetings has been, on almost every occasion, very large, and the exhibits during the year have certainly not fallen below the average either in number or interest.

One of our former Presidents, Mr. F. Merrifield, again offered a handsome donation to the Travel Grant, an offer which has been generously renewed for the coming season. No other application having been received by the Council, and Mr. Merrifield having expressed his entire willingness that under those circumstances the grant should be given in two consecutive years to the same applicant, Mr. B. C. S. Warren, one of our Fellows, was again the recipient, and went for an entomological tour in the Pyrenees and elsewhere in Southern France.

A successful Conversazione was held on May the 17th, by the kind permission of the Linnean Society, in their Rooms at Burlington House, and the Council wishes again to put on record its grateful sense of their generosity, owing to which the subscriptions given to this object by our Fellows have not only paid the expenses of this year's function, but have enabled the Treasurer to write off a debt of over £6, formerly charged to the general expenses of the Society, which had been previously incurred on a similar occasion.

Our Society took its share in the successful attempt to prevent the contemplated alienation of a part of the ground assigned to the Natural History Museum, and we may congratulate ourselves, as well as the Museum authorities, on the issue.

A second International Entomological Congress is to be held in Oxford in August next, from the 5th to the 10th, at which many of our Fellows will doubtless be present.

The Treasurer reports that after carrying forward to 1912 £15 15*s.* for subscriptions paid in advance, investing £47 5*s.* in Consols for three life compositions, and paying all bills rendered to date, there remains an available cash balance in favour of the Society of £32 5*s.* 11*d.*

The subscriptions for the year are £11 11*s.* in excess of

1910; an increase of £33 10*s.* 3*d.* is shown in the amount of donations, and a satisfactory increase of £42 16*s.* 3*d.* in the amount realized by sales of Transactions, but there have been corresponding increases in the cost of their production, the net balance of £32 5*s.* 11*d.* corresponding approximately with the balance of £30 11*s.* 10*d.* for the previous year.

The Librarian reports that forty-seven volumes and a large quantity of separata and the usual periodicals and publications of Societies have been added to the Library during the past twelve months, a list of which will be included in Part V. of the Transactions. Two hundred and ninety-five volumes have been issued for home use, as against a total of two hundred and fifty-seven in the previous year. The Library has also bee largely used for the purpose of reference.

On the proposal of Mr. Claude Morley, seconded by Mr. Stanley Edwards, the Report was adopted unanimously.

No other nominations having been received by the Secretaries, it was proposed by Mr. H. Main, and seconded by Mr. A. Bacot, that the Officers and other members of the Council nominated by the Council be elected *en bloc.* Mr. R. W. Lloyd raised the objection that no other names having been received, the Council's nominees were *ipso facto* elected; this objection was ruled by the President to be effective, and on the suggestion of Mr. H. Main he declared the following to be duly elected:—President, the Rev. F. D. Morice, M.A.; Treasurer, Albert Hugh Jones; Secretaries, Commander J. J. Walker, M.A., R.N., F.L.S., and the Rev. George Wheeler, M.A., F.Z.S.; Librarian, George Charles Champion, A.L.S., F.Z.S.; other members of the Council: Robert Adkin, George T. Bethune-Baker, F.L.S., F.Z.S., Malcolm Burr, D.Sc., F.L.S., F.Z.S., Horace St. J. K. Donisthorpe, F.Z.S., John Hartley Durrant, Stanley Edwards, F.L.S., F.Z.S., A. E. Gibbs, F.L.S., F.R.H.S., W. E. Sharp, Alfred Sich, J. R. le B. Tomlin, M.A., Henry Jerome Turner, Colbran J. Wainwright.

The Rev. F. D. Morice, the President, then delivered an Address, at the close of which Dr. F. A. Dixey proposed and Prof. W. Bateson seconded a vote authorizing the publication

of the Address, and thanking the President for the same and for the series of seven plates which he had presented to illustrate it, and also for his services during the past session. This was carried unanimously, and the President replied with a few words of thanks.

A vote of thanks to the Officers for their services during the past year was then proposed by Mr. C. O. Waterhouse, in reply to which Mr. A. H. Jones and the Rev. G. Wheeler, the only two Officers then present, returned thanks.

ENTOMOLOGICAL SOCIETY OF LONDON.

Balance Sheet for the Year 1911.

Receipts.	£	s.	d.	Payments.	£	s.	d.
Balance in hand, 1st Jan., 1911, and at Bankers ...	30	11	10	Printing Transactions, etc.	335	7	0
Subscriptions for 1911 ...	464	2	0	Plates, etc.	209	9	10
Arrears	25	4	0	Rent and Office Expenses	163	3	1
Admission Fees	42	0	0	Books and Binding	44	1	2
Donations	84	9	11	Investment in Consols as per contra	47	5	0
Sales of Transactions ...	106	9	6	Subscriptions in Advance, per contra carried to 1912	15	15	0
Interest on Investments:—				Balance in hand and at Bankers	32	5	11
Consols £24 14 5							
Westwood Bequest:—							
Birmingham 3 per cents. ... 6 15 4							
	31	9	9				
Subscriptions in Advance	15	15	0				
3 Life Compositions ...	47	5	0				
	£847	7	0		£847	7	0

Travel Grant.

	£	s.	d.		£	s.	d.
Received from Mr. Frederic Merrifield	21	0	0	Paid to Mr. B. C. S. Warren	21	0	0

Assets.	£	s.	d.
Subscriptions in arrear considered good	70	0	0
Cost of £1,104 11*s.* 3*d.* Consols. Present value at the price of 77⅛ on 30th December, 1911, £851 18*s.* 0*d.*	1,044	3	0
Cost of £239 12*s.* 4*d.* Birmingham 3 per cents. Present value at the price of 85½ on 30th December, 1911, £204 17*s.* 5*d.*	250	0	0
Balance in hand	32	5	11
Additional Assets:— Contents of Library, and unsold Stock.			
	£1,396	8	11

Liabilities.

Cost of printing, etc., Parts 3, 4 and 5.

Audited, compared with vouchers and found correct—

R. W. Lloyd.
Alfred Sich.
Hamilton H. Druce.
Hy. J. Turner.

Less total depreciation of £237 7*s.* 7*d.* in the value of the Securities.

A. Hugh Jones, *Treasurer.*
3rd January, 1912.

THE PRESIDENT'S ADDRESS.

Ladies and Gentlemen,

I find it difficult either to speak, or not to speak, of the unprecedented and most inauspicious circumstances under which we entered upon the Session now expiring—circumstances which were fraught with deep personal sorrow for many; with awe, astonishment, perplexity, and disappointment of anticipations for all—circumstances, which caused this Session to commence, as no Session has ever before commenced, with an Interregnum, and but for which, at this very moment, not I but another would be occupying this Chair and delivering this Address.

These things cannot be forgotten, but it seems useless and only painful to dwell upon them. I turn, therefore, to consider facts as they now stand. What may we infer, from such evidence as is before us, as to the position and prospects of the Society now and in the immediate future?

You have heard the Report of the Council, and it cannot be necessary for me to say over again what is said there already. You will not have failed to notice the encouraging symptom of yet another rise in the total number of our Fellows. Most of you are far better judges than I of financial matters, and the Treasurer's accounts are before you to speak for themselves. I shall only refer to an item which is surely hopeful—a considerable increase in the profits from sale of Transactions.

These Transactions to my mind are—not necessarily the most valuable part of the work which such a Society as ours does or can do; but at least they are a very valuable part of it, and certainly they are that part which is most influential in placing the Society and its work on a pedestal of eminence in the eyes of the general scientific public. By them, more

than by anything else, our credit sinks or rises in those circles to whose judgment we cannot be indifferent. Even a straw may show which way the wind blows; and as it is probable that no copy of our Transactions is ever sold except to some one moving in the circles to which I have just alluded, I cannot but infer from a substantial rise in their sales at least a certain rise in their reputation among those for whose approval we most care.

I dislike boasting, but I think it is generally allowed that our Transactions, taken one year with another, are not surpassed in the quality of the Papers contained in them, nor the beauty and scientific value of the Plates, nor the care and skill with which their Editor performs his thankless, incessant, and most laborious task, by those of any Entomological Society in the world. And as long as such a standard can be maintained, without bringing the Society to actual bankruptcy, I am not inclined to "despair of the Republic." Scientific societies, I believe, generally manage to exist, as long as they are doing really first-rate work, and are known to do so by those who can judge of it.

The full utility, however, of a Society like ours probably cannot be ascertained either from outside opinion however competent, or from any definite and tangible facts which can be expressed in figures or inferred from statistics. Thus I believe—but from the nature of the case can produce no proofs of it—that year by year, partly at least through the influence of this Society, individual Fellows (unknown to me personally) are being stimulated to do good work (which I am not qualified to put a value upon, even if I knew of it): that (equally without these things coming to my notice) workers on parallel lines of research are being drawn by it into helpful association and intercourse with one another, and made acquainted with older and more experienced workers in the same line, thus gaining help, information, advice, etc., for which—but for attending our Ordinary Meetings—they would not have known where to apply, etc., etc. To what extent this is happening in one session as compared with another is very hard—in fact, I should say, quite impossible—to ascertain, and cannot be inferred from the most suggestive of reports.

However, of the general vitality of the Society in one session as compared with another—whether it is alive and vigorous and likely for a while to continue so—we can probably judge in a rough way from such tests as the average attendance at our Ordinary Meetings, the number of exhibits, the amount of interest that appears to be excited by them and the discussions arising out of them. Here, again, are matters which can only be partially indicated by reports and statistics, but then it is always possible to get further indications by the simple process of attending oneself at the meetings and taking note of what goes on. I myself, for instance, have been a pretty regular attendant at our meetings during a good many years; and without making comparisons, which are always odious, I should not hesitate to say that the meetings of the closing session have been particularly well attended, and that as to frequency of exhibits, and the supply generally of interesting objects and observations—I have only at times regretted that they were too many to receive proper attention within the limits of the time at our disposal.

On the whole, putting together what we have heard from the Council, and my own experiences of our meetings, and my opinion (so far as I am competent to form one) of the quality of last year's Transactions so far as they have been yet published, I think—and I hope you will think so too—that the Barometer of the Society's fortunes points at the present time to "Settled. Fair."

Eventful as the year 1911 has been from many points of view, I am not aware that it has been especially eventful in matters directly interesting to us as entomologists, or as Fellows of this Society. Once, indeed, in its course, as we all know, a black cloud gathered on the horizon; and not only every entomologist, but every one interested in Natural History in any sense throughout this country, heard with real terror that our Government had consented to an outrageous proposal to deprive the Natural History Museum at South Kensington of land long ago definitely allocated to it, and absolutely necessary—I do not say for any adequate future extension of its buildings, but even for such extension as is demanded by its immediate and imperative needs. Happily,

saner counsels prevailed. We shall not be so foolish, nor so ungrateful to societies more influential than our own, and to individuals outside our own body, who organised the campaign which saved the cause, as to pretend that it was our own arm which brought us the victory; but at least we may feel glad that, both as a society and as individuals, we ranged ourselves under the leaders to whom that victory was due, and followed wherever they led us, till the fight was won. And I am very sure that nowhere—not in the Museum itself, not in the hearts of its most potent champions—was there more anxiety over its danger, and rejoicing over its escape, than in the Entomological Society of London.

It seems a sort of "bathos" to turn from a matter of such grave concern to congratulate the Society on the successful Conversazione held by it last May. But it is only proper that we should remember and acknowledge the great kindness of the Linnean Society in placing their splendid Rooms at our disposal. And those who know, as I do, how magnificently my friend Mr. Wheeler toiled and slaved to make it a success, or who listened to the Lectures and examined the Exhibits, will feel that as a Society we owe great thanks to not a few of our individual Fellows for their public-spirited exertions. Personally, as I had to stand shaking hands at the top of the staircase most of the evening, my enjoyment was, perhaps, rather monotonous. But I know that the Conversazione was thoroughly enjoyed by many who were present at it; and I may say that I know also of more cases than one in which those who were then the Society's guests have since become its Fellows.

I ought not to leave unmentioned a coming event in which at least as individuals it may be presumed that we all feel interested, and in which at the proper time I hope that, as a Society, we may be allowed to express our interest. I allude, of course, to the International Congress of Entomologists which will assemble next autumn at Oxford, under the presidency of Professor Poulton. I believe it will be felt not a duty only, but a pleasure, by every British entomologist, to do anything that may lie in his power to contribute to the success of that very important gathering. And for any information that any one here may wish to receive on the subject, I venture to refer

him to Dr. Malcolm Burr, who will, I am certain, be both able and willing to furnish it.

The list of losses sustained in the Session now closing by deaths among our Fellows is not a long one. But such losses, to be truly estimated, must be weighed, not counted. And so estimated they are serious indeed.

Obituary.

Honorary Fellows.

Pieter Cornelius Tobias Snellen, of Rotterdam, was our senior honorary Fellow, elected so long ago as 1885. He died (æt. 77) on March 29th of last year. He is principally known by a magnificent work on "The Lepidoptera of the Netherlands," the first volume of which (published in 1867) dealt with the "Macros," the second, appearing twenty years afterwards (when he was already on our roll of Hon. Fellows), with the "Micros." Recently he assisted in producing an important work on "The Rhopalocera of Java."

Samuel Hubbard Scudder, formerly of Boston and afterwards of Cambridge, U.S.A., was elected Hon. Fellow in 1895, and died (æt. 74) on May 7th, 1911. He was an Entomologist of world-wide celebrity, and author of innumerable works dealing for the most part with American *Lepidoptera*, some of a popular character, others standard monographs of the highest scientific importance. The mere list of writings by him which were in our Society's library so long ago as 1893 occupies many pages of the Catalogue published in that year. He was also a leading authority on the subject of *Fossil Insects*, and in connection with his researches on that subject became further renowned as an Orthopterist and a Neuropterist. Fuller details of his career and writings may be found in almost all the leading scientific periodicals.*

Ordinary Fellows.

Oscar C. Silverlock became a Fellow in 1909, and died on March 22nd, 1911. I am unable to state his exact age; but

* The vacancies on our roll of Hon. Fellows caused by the deaths of these two great Naturalists have been filled by the election of Father Erich Wasmann, S.J. (Holland), and Professor John Henry Comstock (U.S.A.).

I know that he was a young and remarkably promising entomologist, in whom the late E. Saunders took considerable interest. In one of his visits to Woking he succeeded in adding a new Bee and a new Fossorial Wasp to the British List; and as these were found in a locality that had been frequently searched by Saunders, myself, and many others, he must have been either a very expert collector or exceptionally fortunate. He was formerly science-master in a Grammar School, and at one time competed for a vacant post in the Natural History Museum. Ultimately, he was employed by the British South African Company to investigate the "Tsetse" Fly and other noxious insects. His death was sudden and tragical. He was drowned in the Zambesi River, his boat having been capsized by a hippopotamus.

The Rev. Charles Thomas Cruttwell (Canon of Peterborough and Vicar of Ewelme) became a Fellow in 1902, and died (æt. 63) on April 4th, 1911.

His career at Oxford University was exceptionally brilliant, and he maintained his reputation as a Classical and Theological scholar by the publication of many well-known works on such subjects. He was also the occupant of distinguished posts in the scholastic profession, having been successively Headmaster of Bradfield and Malvern Colleges.

For obvious reasons it was impossible for Mr. Cruttwell to make much more than a recreation of Entomology. But in such leisure as he had he was a zealous collector both of *Macro-* and *Micro-Lepidoptera*, and likewise of *Coleoptera*. He published (I believe) on such subjects nothing beyond occasional records of captures, and I do not remember to have met him at any of our Ordinary Meetings; but he was undoubtedly one who must have attained considerable eminence in Natural History had it been possible for him seriously to aim at it.

William Alfred Rollason became a Fellow in 1909, and died at Truro, where he had been Art Master since 1899 in the Central Technical Schools, on April 23rd, 1911. He was a man of exceptional gifts and culture in many ways, an artist, a musician, etc., and also an ardent and laborious entomologist; and his sudden death, at the age of 48, came as a great shock to friends and admirers in many places.

He seldom visited London; and personally I knew him only by correspondence as to his captures of *Hymenoptera* in Cornwall, many of which were of considerable interest, and of which he published a list in "Ent. Mo. Mag.," April 1911, the month in which he died. He had previously corresponded with Mr. E. Saunders on the same subject. For many years he had devoted much time to the British *Lepidoptera*, and had executed a series of coloured drawings of their larvae, with the intention of publishing, ultimately, an illustrated text-book on the subject. Had he been spared, I feel convinced that he would have made great additions to our knowledge of the Cornish fauna. He had only studied the *Hymenoptera* for a few years at most, but his knowledge of them was already far from superficial.

Alexander Henry Clark, who died (æt. 74) on July 25th, 1911, was one of our oldest Fellows, elected so long ago as 1867. Succeeding his father many years ago as the senior partner in a leading firm of solicitors in the City, and remaining in that position until his death, he was naturally unable to indulge his strong natural interest in Entomology to the full; and of late years increasing age and failing health made it impossible for him to be a frequent attendant at our meetings, or at those of the South London Society, to which he also belonged. But he was to the last, so far as health and leisure permitted it, an enthusiastic collector of *Lepidoptera*, and his name occurs frequently in the works of our leading writers on that subject—South, Tutt, etc. He contributed frequent notes on captures and biological observations to the "Entom. Record," and his capture of *Orrhodia erythrocephala*, F. (then a great rarity) in 1859 excited considerable interest at the time. Even his leisure could not be exclusively devoted to Entomology, for he was also seriously interested in many very different branches of study, *e. g.* Botany, Ancient History, and even Assyriology.

Albert Harrison was born in 1860, became a Fellow in 1897, and died suddenly of haemorrhage on the brain on August 27th, 1911. From 1908 to 1910 he was a Member of the Council. As London manager for an important sugar-refinery in Liverpool he was necessarily much occupied with

its business; but he was, notwithstanding, a serious worker in entomology, and a most regular attendant, and frequently an exhibitor, both at our own meetings and at those of the South London Society, of which in 1899 he was President. He published little, but what he *has* published has attracted considerable attention from competent judges. Most of his work was connected with the *Lepidoptera*. He was associated with his friend and brother-in-law, Mr. Hugh Main, in forming a collection of those insects, largely consisting of bred specimens; and also in breeding-experiments and observations, mainly directed to the solution of questions connected with Variation, Inheritance of Characters, Mendel's Law, etc. I am glad to see it stated in "Ent. Mo. Mag.," November 1911, that the collection and work will be continued by his fellow-worker. Mr. Harrison was a member of many scientific societies, the Linnean, Zoological, Microscopical, Chemical, etc., etc. His interests were by no means confined to entomology; and though, as an entomologist, he was best known for his work on the *Lepidoptera*, he was not unacquainted with, nor uninterested in, other branches of our science.

George Henry Verrall, born at Lewes on February 7th, 1848, became a Fellow in 1866, served for a short time as Hon. Secretary and frequently as a member of the Council, and was President in the Sessions 1899–1900. He died on September 22nd, 1911. Mr. Verrall may almost be called the creator of British Dipterology, and its present comparative popularity is undoubtedly due for the most part to his researches and his personal influence.

Too often, when the chief authority on a special subject passes away, large stores of accumulated but as yet unpublished knowledge perish with him. We may well rejoice that, in this case, it is far otherwise; and that Mr. Verrall has bequeathed his experience as well as his collections of books and insects to one who has long shared his labours, and is equipped at all points to take them up from the point where they were laid down.

——*Primo avolso non deficit alter*
Aureus et simili frondescit virga metallo.

Of Mr. Verrall's great but uncompleted *Monograph* I am only qualified to say that it is universally recognised as worthy of its eminent author.

My personal reminiscences of Mr. Verrall commence from the time when he was President. I listened, with delight which I shall never forget, to both of the Addresses which he delivered in that capacity at the Annual Meetings. Vividly can I recall the pleasant voice, the polished style, the transparent clearness with which he propounded and justified his real opinions on a subject, and the merry twinkle in his eye, as from time to time he startled his hearers with a deliberate paradox, or made ideas and practices which he disapproved seem not so much objectionable as harmlessly ridiculous. Strong common sense, wide reading and experience always present in the background but obtruded as little as possible, graceful courtesy to his audience and even to his opponents, and above all a sort of infectious good-humour which made him simply irresistible—such are my recollections of him on these ocasions, and, indeed, whenever I have had the pleasure of listening to him. First and foremost, I must think of him as naturally a strong and most kindly personality; secondly, as one polished and fortified by wide and varied experiences of men, and things, and the thoughts of others; and thirdly, as one of the foremost and most influential specialists of our times.

It was in his capacity as a member of the Entomological Club, and not as a Fellow of our own Society, that Mr. Verrall extended year by year to all sorts and conditions of entomologists those splendid hospitalities which so many of us have frequently enjoyed; and I therefore refer to them only to express my strong personal hope that the institution—for such it had become—of his Annual Supper may in some way be perpetuated as a memorial to him. (The perpetuity of another of his generous and thoughtful plans for the benefit of his fellow-entomologists is happily assured already by arrangements of his own making—the preservation of Wicken Fen.) Also, as only concerning us indirectly (though we are naturally glad to reckon among our Fellows men of mark and influence in other spheres), I shall here only allude to Mr. Verrall's distinguished and useful career in business, as a

magistrate, an occupant of many local offices, and a Member of Parliament. That career may be summed up in a single trite quotation : "There was nearly nothing that he did not touch, and whatever he touched he adorned."

Jules Bourgeois became a Fellow in 1904. He died within the present Session, but at what age, and on what exact day, I am unable to state. He was the chief authority on a *Coleopterous* group—the *Lycidae* ; and I hear that he possessed an important collection of these insects (containing many ("types"), which he has bequeathed to the Paris Museum. He resided, I believe, in Alsace-Lorraine.

Frank Wray Terry, born at Battersea on February 14th, 1877, became a Fellow in 1910, and died at New York on November 8th, 1911.

The life which has closed so prematurely was full of the brightest promise ; a life surely worth living, and, in the strictest sense of the term, an *exemplary* life.

Commencing in 1892, with his foot, as it were, on the lowest step of the ladder, as a boy employed in the Insect Room of the Natural History Museum, he soon became an expert in the preparation and mounting of objects, and acquired by degrees a good general knowledge of Entomology and other branches of Natural History. Thus he fitted himself to discharge the duties involved in accepting an opportunity which presently offered itself. In 1902, together with our late Fellow Mr. Kirkaldy, he was engaged by the Sugar-Planters' Association of Hawaii to investigate the life-history of various insect-pests. His work was performed with ability, zeal, and success, and to all appearance he seemed destined to take a foremost rank among economic entomologists. After eight years thus spent, he revisited England on leave ; but he was impatient, though feeling far from well, to resume his task ; and it was on his way back to Hawaii that the end came.

Such a career must recall the old saying, not surely a whole truth, but at least a half truth, "Those whom the gods love die young."

Among entomological workers outside our own Society who have passed away since our last Annual Meeting, I can only

name a few : though doubtless there are others whom, but for lack of knowledge, I should be bound to mention.

Oscar Schulz, the author of important papers on the subject of Gynandromorphism among the *Lepidoptera* ; Max Wiskott, of Breslau, who bequeathed to the University Museum of that town a famous collection of varieties, gynandromorphic specimens, etc., among the *Lepidoptera* ; Edouard Piaget (aet. 93 !), of Neuchatel, author of a great work on Ectoparasites ; Felix Plateau, widely known as a foremost authority on the eye-sight, flight, etc., of Insects ; Dr. Hodgson, of Redhill, described in the "Entomologists' Record" last March, on the high authority of Dr. Chapman, as "one of our more thoughtful entomologists" ; and Mrs. Edith Wollaston, who shared the travels and studies of her late husband, the famous Coleopterist, and contributed on her own account to the literature of the *Lepidoptera*.

Nor can the list of our losses be meetly closed without allusion to two great men, whom in common with the whole scientific world we have had to mourn in the year just past. Neither, I believe, was professedly an Entomologist, nor directly connected with our Society (*tales cum fuerint, utinam nostri fuissent !*), but each was supremely eminent in his own department of Biology ; and each was an illustrious veteran, who, like Homer's Nestor, had achieved greatness in an age of heroes, and survived to be a leader among their children's children—Sir Joseph Dalton Hooker, the prince of modern Botanists, and to some of us revered yet more, as the bosom-friend and confidant of Darwin ; and Sir Francis Galton, not a friend only but a relative of Darwin, a chief pioneer in the scientific study of Heredity (so supremely interesting at this time to every serious investigator of Nature), and the recognised founder of "Eugenics."

I come now to the duty, imposed on me by long custom, but not (I believe) by any positive enactment, of announcing a "special subject" and addressing you upon it. That duty has been described, from this chair, and on an occasion like the present, as a responsibility which many men might not unreasonably hesitate to accept, however highly they would

appreciate the honour of presiding over the Meetings of this Society. *Per contra* another of our ex-Presidents lately told me that he viewed it, and always had viewed it, not as a task but as an opportunity. For myself, I know only too well that I should be taking myself a great deal too seriously, if I allowed the possible consequences of anything that I may say to-night either to weigh upon my conscience overmuch, or to thrill me with exulting anticipations. So without preface I will announce as my "special subject"—

The Terebrae of the Chalastogastra,

or, in plain English, The Saws (so called) of Sawflies.

This is a matter of which it may be assumed that we all know something; for it would be difficult to name a text-book or popular work of any kind dealing with Entomology in general which does not figure the organ just mentioned and expatiate on its marvellous adaptation to the work in which it is employed. Summed up roughly, the general outline of the story comes to this—that there is a Group, or Genus, or Species (*which* to call it is usually left to the taste of the reader), at any rate there is an Insect among the *Hymenoptera* called a Sawfly, which lays its eggs in plants, and that, for this purpose, Nature has armed it with a marvellous tool, differing (as Réaumur says in an oft-quoted and highly rhetorical passage) from human saws only in its greater perfection, and in the material of which it is formed. This tool is described as, so to speak, the *αὐτὸ τό* or absolute ideal of a saw—the Divine Original, of which the human saw is an inferior copy—a saw of which every tooth is denticulated, and thus becomes a saw itself. It is added (after a remark of Newport's) that though never ceasing to be "a saw" it is also "a lancet and a file." With this instrument it saws "wood," or "leaves," or "stems," or "branches," etc. We are not, as a rule, told anything as to the exact nature of the incisions made; whether they are simple *holes*, or *broad excavations*, or *grooves*, such as our saws make, and such as might be expected to be made by a "saw of saws." Now and then, however, a writer says that the saw "both cuts and pierces," or another that "it does *not* pierce (as a sting

does), but only cuts." We may or may not be told that really it is "not one saw, but a *pair* of saws," and that these play alternately, and help each other, one making a cut and the other deepening it; and this duplication is, sometimes—perhaps not actually said—but at least hinted, to be an additional mark of superiority to the human saw. Again it may or may not be told us that the saw is a "tenon saw," one which has a solid support, or back-piece, to prevent it from being deflected, and possibly broken, as it travels along. In the usual descriptions of its form, I think I may say without exaggeration, that *no aspect of it is ever alluded to except the lateral*—that in which practically all entomological objects are presented in ordinary microscopical preparations. It seems to be tacitly assumed that, as is really the case with an ordinary saw, a sufficient notion of its shape for all practical purposes can be given by disregarding the question of its *thickness* and representing it as an object of only two dimensions. Finally, we learn that the saw, when not in use, is concealed within "a sheath."

In this *résumé*, no doubt I have accidentally made omissions, and probably done less than justice to some of the authors whose works I have in mind. But I have really tried to give a faithful picture of the sort of impression which as a whole they would leave on a reader not caring too much to inquire into minutiae, but desiring to have a broad general notion of the facts. Such a broad general notion of phenomena outside the sphere of his own particular studies, is all that even a professed entomologist can fairly expect, or be expected, to possess. And as long as the main facts communicated to him are true and the inevitable omissions and ignoring of exceptions and difficulties and apparent inconsistencies in the story are not sufficient to put a really false colour on the substantial import of the phenomena described, he has perhaps no reason to find fault with the description.

But I think that, as I proceed, I shall be able to convince you that the narrative which I have tried to summarise, and which, to the best of my belief, generally passes current as substantially correct, contains along with a great deal of fact much also which is fantastic in its exaggeration, omissions

which really make misconceptions inevitable, and suggestions of falsehood, even where nothing actually false is stated. The result is a distorted picture, where even the realities are seen in false perspective, and which, though ultimately derived from certain extremely veracious and careful reports of eye-witnesses, is inconsistent with itself and with the truth.

Assuming that I am correct in this, I think it is not difficult to see how and why the story has become distorted—and the same cause, exactly, seems to me to explain its popularity.

The average intelligent human mind is, of course, not like a sheet of white paper, ready to receive any marks made upon it, and to retain them equally. It is more like a photographic film, sensitive to certain rays and practically blind to others, and a ray, to take full effect upon it, must have a certain minimum of strength and fall on it in certain directions. To drop metaphor, the public which reads and reflects on any account of a natural phenomenon reported to it by an author whom it believes to be reliable, and in such a form as does not tax its reasoning powers too severely, but which is neither competent nor inclined to undertake an independent investigation of the facts—this public, I say, is strongly impressed by certain of such accounts, and hardly at all by others, chiefly if not entirely in proportion as they do or do not appeal to certain of its own pre-existing "Obsessions." The average human mind has Tastes of its own, just as the body has, some of which are especially insistent in particular ages, but some of them at least seem to be universal, immemorial, and ineradicable. It has a taste, for instance, and always has had, for anything which is frankly *Paradoxical*, such as a Fire-breathing Dragon or a Flesh-eating Plant, or an animal which can turn itself inside out, or be frozen hard without being seriously the worse for it. It has a taste for anything which, if I may say so, seems to run into *extremes* whether in the direction of the Infinite or the Infinitesimal—Giants and Dwarfs, Aphides producing offspring by the quadrillion per annum; carcases consumed (as Linné says) more speedily by a Blowfly than by a Lion: exquisitely elaborate structures only just visible at the highest powers of our most powerful

microscopes, etc. Then there is the *Teleological* taste which —to parody Wordsworth's phrase—makes the "heart leap up when it beholds" anything in Nature which has the appearance of Design. We are all, I believe, teleologists of some school or other at heart, and inclined, I will not say to exaggerate, but at any rate to lay full stress on any phenomenon—however we account for it—in which it seems evident that a structure is advantageous to its possessor and suitable for the uses that are actually made of it. Lastly, I notice a taste which may be called the *Anthropomorphic* obsession—the readiness ingrained in human intelligence to see its own productions imitated or anticipated by Nature—that which makes us pleased and even eager to be told of lower animals practising human occupations, and employing tools or other appliances like our own—Fishes which are Anglers or Electricians; Communism, Parasitism, and Commensalism among all sorts of lowly animals; Insects accepting or refusing Sovereigns to reign over them, and paying court to them when accepted; masons, carpenters, and upholsterers among the Bees; Ants which maintain soldiers, kidnap slaves, build towns, store provisions, grow vegetables, keep cows and milk them; Insects armed with rapiers, broadswords, poison-flasks and explosives; digging pit-falls; weaving nets; carrying umbrellas, lamps, scent-bottles, fiddles and fiddlesticks, spurs, combs and brushes, instruments like those of human surgeons, or tools like those of human workmen. Sometimes, no doubt, such stories rather amuse than seriously interest us. But even amusement is a kind of interest, and the things which are able to amuse a man are no bad indication of his normal mental tastes.

Now what, meaning no offence, I shall for the moment call the popular legend of *The Sawfly and its Saws*, seems to me to appeal to every one of those obsessions or tastes of the normal human intelligence to which I have alluded.

The phenomenon described in that legend, when first related to any one, must certainly appear surprising. Nor is it one which is seen so often as to have become familiar to us and no longer paradoxical. The almost inconceivable delicacy, minuteness, and elaboration of the saws is another point which is constantly pressed upon our notice. And the general con-

ception of an insect which saws wood as we do, but with an implement which is not only adapted but "ideal" for that purpose, and which, but for its perfections and minuteness, would be identical with the saws of human carpenters—surely this is the *ne plus ultra* of Teleology and Anthropomorphism combined.

So much for the causes of its popularity, but how have they affected its truth? Mainly, it seems to me, as follows.

To all intents and purposes the whole of the literature from which English readers, except a few specialists, derive their ideas upon the subject has arisen out of a single set of observations—those of Réaumur on a species previously undescribed, but identical, in my opinion, beyond a doubt with what is now known all over Europe as *Arge* (or *Hylotoma*) *rosae* of De Geer.

These observations were made with extreme care and completeness in every respect, and reported in the minutest detail. Réaumur watched repeatedly the living insect in the act of excavating fresh shoots of the rose, and subsequently laying an egg in the excavation. He tells us exactly what he saw from first to last, how much with the naked eye, and how much with lenses, how the insect stood and generally comported itself, how and when precisely the "saw" became visible, how it entered the stem, and how much he could see, or was at times unable to see, of the movements made by it. Besides this, he gives a number of figures (which I reproduce in the plates appended to this Address) showing both sexes of the insect, the excavations, the eggs, and the instrument used in the operation—this instrument as a whole, and also its separate component parts and attachments to the body, being shown in several different aspects, and at various magnifications. In every single positive statement made by him as to the facts which he observed he is, I feel certain, absolutely to be trusted. Only it must not be forgotten that he only professes to record the operations of a single species, and that he distinctly affirms his belief that not all Sawflies work in exactly the same manner.

It is only when Réaumur sums up the general impressions made upon him by his observations, that an unprejudiced

reader may begin to find him unconvincing. Admirably honest though he was as a witness, he was also a rhetorician, and an advocate of particular views. One cannot but feel that he sometimes exaggerates (or at least over-emphasises) certain phenomena, and (though never actually suppressing them) lays small weight upon others, because all through his narrative he was *obsessed by a desire to find the analogy between the insect's saw and the human saw as complete as possible.* Even where he recognises and admits real differences, he seems anxious to believe them to be non-essential. He might have shown, I think, from his own facts and figures, that to think of the implement as merely *one kind of saw* (however idealised *quà* saw) gives an inadequate and really unworthy conception of its actual powers, and adaptation to several quite different functions. But to show this, or to see it himself, seems simply not to have occurred to him. Otherwise, even if it had seemed to him to spoil his story, I believe he *would* have shown it! Besides this anthropomorphic bias, Réaumur was also a convinced and enthusiastic upholder of Teleology in the old sense of the word. I do not know what were his precise theological views, but his attitude to "Nature and Nature's God" was exactly that of the eighteenth-century Deists.

Such, if I can judge it fairly, was the actual story which Réaumur introduced to the scientific world; perfectly correct as to the facts, and told with great clearness and unusual fullness of detail—for pure literary excellence scarcely ever paralleled, unless in our own times by the writings of Fabre—but soaring into highest eloquence, exactly when the narrator ceases to narrate, and begins to moralise and generalise. When, however, that story passed from the original author into the hands of translators and compilers of text-books, who were themselves obsessed by the same ruling ideas as Réaumur, but were comparatively uninterested in the details qualifications, and explanations which he had so carefully introduced into his own story—not unnaturally they fastened on everything in it which was most striking and satisfactory to their own mental tastes (the rhetoric, the hyperboles, the strained analogies and so forth), while they omitted, as though

irrelevant and tedious, whatever did not seem to bear upon the main thesis, namely, *that the God of Nature has furnished a certain insect with the essential archetype of an unimprovable Tenon Saw.*

I feel sure that if any one whose ideas of a Sawfly and its operations are derived from any modern text-book will take the trouble to see what Réaumur really had to say on the subject, he will be simply amazed to find how much more intelligible and convincing the story is in its original shape, and will feel as I do, what a pity it is that Réaumur's work, which was once in the hands of every entomologist in Europe, should have become what is called a Classic—that is to say, a book which every one has heard of and no one reads!

I will now indicate briefly a few reasons which convince me that the Sawfly's implement, as a whole, cannot properly be called a saw, ideal or otherwise. By saying as a whole, I mean to save myself from denying that certain small parts of it may act in a sense as saws. Consider what we mean by sawing as opposed to other methods of dividing solid substances. A toothed edge (the teeth nearly always "set"—*i. e.* deflected alternately to right and left) is applied more or less horizontally to some such material as a piece of wood, and this the "teeth" scratch, tearing away and pushing before them small fragments (sawdust), and gradually forming a groove of increasing depth, but constant width (this being determined by that of the "set"), into which a considerable portion of the blade slowly and evenly descends. Such a descent would obviously be impossible if the thickness of the saw, *at any part of it which was to enter the groove*, should exceed the width of that groove, or (which comes to the same thing) the space *included between the tips of the teeth*. If the teeth were not deflected at all, the blade would have to be thinner still—practically an object of only two dimensions, *length* and *breadth*. Next, the blade being already partly embedded, the teeth have to go on scratching, and in whatever direction they move the blade must, of course, move too. If it cannot do so, the saw is said to "jam," and the work cannot proceed. Accordingly, not only must the blade be limited as

to its *thickness*, but its *surfaces* must practically be simple planes. A piece of corrugated iron could not act as a saw, however one of its edges might be denticulated. A *sort* of "sawing" may, no doubt, be done with a file or a rasp, but it can hardly be considered as ideal carpentry.

Now, if we look at almost any Sawfly's implement *in any aspect but the lateral*, we shall notice that it is utterly unlike any conceivable blade of a true saw. It is generally of very unequal thickness, and particularly thick in parts of it which, we know as a fact, *do* enter into the incisions made by it. Sometimes it is not blade-like at all, but more resembles a spear-head, or some horrible barbed instrument of torture or savage warfare—admirably adapted to *mangle* substances but certainly not to "saw" them. Some even of those which at first sight are *comparatively* possible saws (about as much so as a rasp) prove on closer examination to have their sides corrugated and armed with erect processes, to an extent which would make it impossible for them to pass evenly through any substance less soft than butter. Again, even in the *lateral* view of some so-called saws (*Cladius*, *Lophyrus*, etc.), it is seen at once that the serrations do not form a continuous line of "teeth" along the lower margin, but run in parallel rows *across the blade* (transversely). The notion of a saw embellished by additions which add to its powers those of certain other tools, is at first attractive and seems conceivable. But when any one has really thought out the necessary action of an instrument shaped like many of these so-called saws on such materials as they are known to be employed upon, and has seen the movements made by them when actually so employed by the living insects, he will inevitably come to the conclusion that though the process does include a kind of "sawing," or perhaps rather "carving," this is neither its sole nor even its chief ingredient. The real essence of the operation is first to *pierce*, then to *mangle* and *lacerate*, and also to *carve* (but hardly to *saw* in the strictest sense) *until a pin-prick has become enlarged into a pocket.* There is no "saw-dust," no "groove" formed by clearing away and abolishing some part of the material operated on. Even the tooth-like undulations of the inferior margin, which have obtained

for the implement its popular name, probably never really act as saw-teeth, and are sometimes only tooth-like in the lateral view (foreshortened!). There is splitting, rasping, and general lacerating of tissues by the passage through them of the entire instrument; and (generally not *upon* the so-called teeth but rather *between* them) there are certain extremely minute denticulations (without, however, any "set") which no doubt do the finer parts of the work—that which I called just now the *carving*. But a "real" saw—tenon saw or otherwise—and much more an "ideal" saw—the Sawfly's "saw" is not!

Réaumur's once-famous "Mémoire" on this subject appeared in 1740, and to it, as has been said already, may be traced practically everything that has been written in this country, as to the manner of employment of the so-called Saws. But he was not the first who witnessed and thoroughly investigated the phenomenon. An Italian physician had put on record some years before a set of observations upon it, in some ways hardly inferior to Réaumur's own. The real discoverer of the Sawfly and its Saw I believe to have been Vallisnieri, who published at Padua in 1726 a paper which appears to me in many ways a most remarkable production. Réaumur acknowledges in the most candid and generous fashion his obligations to Vallisnieri; and any one who compares the observations (and still more the plates which illustrate them) of the two authors, will see that these obligations must have been very real. I am glad to have an opportunity for mentioning with respect a most original and thoughtful naturalist, whose services to science in general and to Entomology in particular seem to be almost universally and very undeservedly forgotten. In fact, except as the eponym of a genus in Botany, few of us, I suppose, have ever heard of him at all. His works are now hardly to be procured; though (thanks to Mr. Janson and Dr. Gestro) I have at last obtained a copy of his treatise on our present subject, and am able to reproduce herewith its curious and interesting illustrations on a smaller scale. There is a copy also in the British Museum Library at Bloomsbury (but not at South Kensington), and another—a reprint without the illustrations—in the Linnean Society's Library.

Others, no doubt, exist in libraries; but the above are all that I have come across. My knowledge of Italian is very limited, but with the help of a dictionary I have managed to work through the whole of his observations on what he calls the *Mosca de' Rosai*, and to get a general idea of other treatises contained in the same volume, and more or less connected with it (though they cover a great variety of subjects, and are not entirely confined to Entomology). I gather an impression that the work was published with two main objects; partly to confute views current in his day but now universally abandoned on the subject of Spontaneous Generation; and partly to suggest a scheme of his own for a fresh classification of insects based entirely upon the differences of their life-histories. This notion, I must think, has proved to be somewhat of an *ignis fatuus*; for we all know now that similarities, whether of structure or habits, may be merely analogical and indicative of no real affinity; and yet I do not think that such a notion would have occurred at all at the beginning of the eighteenth century to a man who was not somewhat in advance of his contemporaries, and certainly *a priori* it is not without considerable plausibility. However, returning to my present subject—the story of the Sawfly—I am bound to say that Vallisnieri's treatment of it gives me a high idea of him, as a careful and thoughtful observer, an admirable describer, and a learned all-round naturalist and man of letters. Almost at the beginning of his account he makes a remark, which later writers (as far as I know) have not repeated, and which seems to me to be one of the most sensible and suggestive things that have yet been said on the subject—namely, that the process is analogous to that of *ploughing*; it is furrowing of a suitable soil for the reception of seeds to be presently sown in it. This, to my mind, is both a truer and a more far-reaching simile than the more obvious one of the saw: it takes into account the ultimate objects of the whole operation; it gives a truer notion of that which is most essential in the form and working of the organ—namely, that, whatever else it be, it is most certainly and obviously a *wedge*, and must inevitably act as such on every substance which it penetrates: *i. e.* it proceeds mainly by pushing and, as it were, "shouldering" asunder the

material through which it passes, dividing it more by *splitting* than by *scratching*, though it may at the same time, and, no doubt, *does*, lacerate them in more ways than one. Thus it is with that primitive type of plough, so well described by Virgil, and still, as I am assured, surviving in Italy, certainly till quite recently, and very likely to the present day. So it is with many other weapons and tools both artificial and natural, spear- and arrow-heads, pointed stakes, and conical bullets; nails, screws, and drills; tusks, horns, claws; and even the radicles of germinating plants. All these are essentially "wedges," and act accordingly. And it is to *this* class of tools —and not to that of tools which proceed, like a saw, by scratching particles loose and removing them in the form of sawdust—that I should refer the Sawfly's implement, in consideration both of its form, when viewed all round, and not (as it too often is) in one aspect only—literally a "one-sided view"!—and also of its actual progress through the material operated on, as I have repeatedly watched it in the operations of the living insect.

I fear I am growing tedious, but I want to make clear one chief object of my Address. For the conception of the ideal saw, I want to substitute the conception of an elaborate and complex organ of quite another type—rather an ideal *wedge*, whose essential powers are supplemented by others, *i. e.* it can rasp, scour, and otherwise lacerate, according to peculiarities of armature in particular cases; but, on the whole, it *cleaves* its way, as a ship's prow through the water, or a ploughshare through the soil. If I can make this point clear, I shall be able to say much of what remains to be said more briefly, and with less of tiresome detail.

I shall now enumerate the separate pieces of which the complex organ, called as a whole the *terebra*, invariably consists. Of these there are *ten* in all, or it would perhaps be better to say *five pairs*; each piece being duplicated—simply, I believe, because of the general principle of bilateral symmetry which we find in every insect-structure, and *not because of any advantage which such duplication gives to the organ for performing its special functions.* The same number of pieces, similarly duplicated, occur in the corresponding organs

of the Aculeate Hymenoptera, where the function is quite different; and also (as Lacaze-Duthiers has shown) in many insects belonging to other orders. Of these five pairs, *three* are completely chitinised, and these are visible at all times, as parts of the insect's exoskeleton: they never actually enter themselves into the substances which are excavated, but serve only (1) to protect the two other pairs (which *do* enter the incisions) when they are not thus occupied, and (2) to communicate to them certain of the movements which they have to make.

Two of these chitinised *pairs of pieces* make up what is commonly called the "saw-sheath." It is not, however, a sheath like that of a sword, enclosing the implement all round; but only in the sense in which the handle of a clasp-knife might be called a "sheath" for its blade. The terebra, however, is in two respects at least unlike a clasp-knife; inasmuch as (1) when the blades become sheathed their cutting edges face outwards and not inwards, and (2) while sheathed it is concealed entirely. The third pair of chitinised pieces appear to act as levers, producing movements (of advance and retreat alternately) in the cutting instrument itself. They are called, after Kräpelin, "the triangular plates."

As for the tool itself, it consists of *two pairs* of pieces—not completely chitinised, but partly corneous, and partly frail and membranous. As a whole, it is commonly called the ovipositor, and the ovipositor it is: but, regarded as to its penetrating functions, and its characters indicative of such functions, I shall venture to call it the *Scalpellum—anglicè* "penknife," or (as surgeons term that type of blade) a "scalpel."

The upper (or posterior) pair, often called the "supports," are partially bound together above (by membrane at least), or even practically soldered together; and are also articulated to the base of the "saw-sheath," and *tied* (by a wire-like prolongation of their inferior thickened margins) to the body of the insect; so that neither of them can advance, or retire, without being accompanied by the other, nor can they ever move away from the saw-sheath altogether, but only be *rotated* on its base, as on a pivot. Viewed from beneath, they appear as a

cylindrico-conical trench or half-tube, which narrows gradually towards its apex; their sides are ribbed or corrugated, and are sometimes armed with spine-like projections, pencils of strong bristles, etc., etc. (See Plate II, Fig. 10.)

The "saws," as they are commonly called, viz. the lower (or anterior) pair of the two pairs which together make up the *scalpellum*, are not actually *connate*, either with each other, or with the supports; but, like the latter, they are "wired" to the insect's abdomen, and also are connate with (indeed they seem actually to grow out of) a portion of its ventral surface —this portion not being chitinised any more than are the "saws" themselves. They are completely separable from the "supports" by dissection, but, I believe, never are so separated in the living insect. Whether "sheathed" or in action, their wire-like and shallowly sulcated upper margins cling to the under margins of the supports, along which they can slide backwards and forwards, on the principle of "flange and rail," but from which they never actually part company. Unless, perhaps, at their inferior margins, it is impossible for them to be in actual contact with each other; and I believe that, in fact, each makes cuts or scratches entirely by itself, independently of the other. These inferior margins are nearly always visibly serrate, or serrately undulate, in a particular point of view, viz. the lateral; but, as I have already said, the real cutting effected by them is probably due to other almost incredibly minute (and really saw-like) denticulations. Often the sides of the "saws" are armed with rasp-like processes, and usually obliquely corrugated—these corrugations more or less corresponding with those of the "supports"; and it is *the apices of these corrugations* that form the projections commonly spoken of as "the teeth."

I must pass entirely over the special and often very paradoxical forms assumed by some of the above ten pieces in the *terebrae* of particular genera and species. The phenomena are extremely interesting, but it is simply impossible to discuss them adequately now; and any one interested in the matter can easily examine them for himself. I will merely refer to various examples of them which are to be found in the Plates accompanying this paper.

We all know that the saws of human workmen differ much both as to shape and size in general, and as to particular details (as the size and form of the individual teeth, the spaces between them, their wider or narrower "set," etc.). Carpenters and cabinet-makers have their rip-saws, dovetail-saws, keyhole-saws, etc. Special types of the same tool are employed by workers in metal. More than twenty "named varieties" of saw are listed by the dealers in surgical instruments—*e. g.* the spoon-saw (a type in which I seem to recognise certain peculiarities shared by it with the Sawflies' organs), the amputation-saw, etc. Every such variation in form indicates some difference in the circumstances of its use, *e. g.* as to the precise nature and situation of the incision to be formed or the character of the material operated on—seasoned timber, sappy living wood, gold, copper, ivory, bone, etc. And an expert would recognise at once in any such case the function especially associated with the peculiarities of a particular type of instrument, and could infer the former from the latter or *vice versa*.

One would expect to find similar correspondences between form and function in comparing the many varied types of natural "saws." The substances on which they operate differ physiologically in their essential structure, comprising, *e. g.* acrogenous, exogenous and endogenous organisms. Some, again, are comparatively dry and hard, others very moist and adhesive. The incisions produced vary in shape and situation; and the precise actions required to produce them must vary also. Notwithstanding, I have so far quite failed to establish any such undoubted correlation between the special characters of particular "saws," or types of "saw," and the *differentiae* of the operations performed by them. I cannot but think that some interesting results would be obtained from an investigation of this matter, embracing a thorough study of the structures and operations of all the known species. But such an investigation could be made only by an entomologist who was also an expert in botany, in physiology, and in theoretic and practical mechanics.

Nor can I believe that, even so, it could be made possible to infer in every case the functions from the structure. It does not seem to be at all a universal law, that an organ is more or

less highly developed and elaborated in accordance with any obvious peculiarity in its actual work. And it is certain—a fact which for many reasons I find exceedingly puzzling—that some ovipositors, apparently highly adapted for employment as excavating tools, are in reality never so used at all; but are possessed by insects which either make no visible perforation whatever, or at most just prick or scratch slightly the surfaces on which they oviposit, and leave the eggs not *embedded* in their resting-place, but merely *adhering* to it.

I come now to another matter which very much interests me, but with which I can now deal only in a most cursory and inadequate way, viz. the actual relation of those ten "pieces" to the original abdominal-segments, out of which we must suppose them to have been developed by adaptation to their present functions. Briefly, I regard the abdomen of a Sawfly as consisting theoretically of *ten* segments, each having two distinct components, one ventral, the other partly dorsal and partly lateral (but with no visible differentiation of the sides and the back—the lateral regions, however, being indicated in all the segments except the 10th, by bearing each a spiracle). Of these segments, or (as Packard calls them) "uromeres," the 1st or basal one (=the "propodeum" or "median segment") is practically incorporated during pupation into the complex structure called the thorax, and is often ignored in enumerations of the abdominal segments. The 10th and 9th are to a certain extent fused into one, which bears *one* pair only of *spiracles*, but, at its extreme apex, a pair of lateral palpiform appendages, called the *cerci*. This fusion occurs, I believe, not during pupation but in the embryonic stage. So at least I understand the statements which I find in books which I have consulted on this matter. Uromeres 2 to 7 can be recognised without difficulty as complete rings or *annuli* (each with its two plates and its pair of spiracles) in the imago of every ♀ Sawfly. The dorsal, or dorso-lateral, plate of uromere 8 is also normal; and the dorsal plate following this and forming the apex of the entire dorsum is also normal in its general appearance, except as to bearing *cerci*—though, as aforesaid, I take it to be really compounded of two uromeres, the 9th and the 10th. The ventral plates of uromeres 10, 9, and 8 are represented, I

believe, by the entire *terebra*, inclusively of its chitinised and corneous pieces and the membranous connections uniting them.

Of the chitinised paired "pieces," I refer the pair forming the apex of the "saw-sheath" to the 10th uromere, those which form its base to the 9th, and the pair which act as levers (=the "triangular plates" of Kräpelin) to the 8th. I draw this inference from their actual positions and attachments to one another, which I cannot account for to my own satisfaction on any other view: but I cannot pretend to have traced their ontogenetic development, which alone could settle the matter finally. Of the non-chitinised pairs, I refer the so-called "supports" to uromere 9, and the so-called "saws" to uromere 8. But here, again, I have only studied the phenomena in the *imago*.

I shall now make a few remarks on the movements which are mechanically possible to an organ constructed and situate as is the *scalpellum*, and which I have actually witnessed as made by or occurring in it. 1.—As a whole, it can be pushed by pressure from behind into any substance sufficiently yielding, *completely up to its hilt*, i. e. up to its junction with the sheath; but *no farther*, because the sheath never itself enters the incision. In this movement its part is entirely *passive*, as when a nail is driven home by taps or pressure on its head. 2.—Also as a whole ("supports" and "saws" together, it can be rotated by muscles contained in the saw-sheath, the base of which serves it for a pivot. In this case, if the base of the saw-sheath remain stationary, the point of the *scalpellum* describes an arc of a *circle*, but, if the pivot move the arc described is (roughly speaking) that of an *ellipse*. (Bearing the above facts in mind, it becomes possible to calculate from the length of the *scalpellum* and the extent to which its base is known to move, the maximum depth and breadth of such an incision as can be formed by it.) 3.—However the "supports" move, the "saws" must be carried along with them, moving in this respect *only as passengers*, and not independently. 4.—The "supports" have no entirely independent motion, either together or separately; except that, to a limited extent, they can stretch asunder

laterally, and so widen and again contract the space contained between them (*e. g.* during the passage between them of an egg for which they have helped to form a nidus.) 5.—They *can*, however, *do*, and even *must*, take a part, which may be called independent, in performing the processes of excavation and oviposition. Their mere form compels them to act as does a wedge, and their special armature in particular cases involves their performance of various other functions, which may be summed up in the general phrase, "laceration of the tissues through which they travel." 6.—The so-called "saws" have separate motions of their own, independent of such as are communicated to them by the supports. These movements are limited, however, to sliding backwards and forwards, along the lower margins of the supports, to such an extent as their attachment to the abdomen permits. And these are the *only* movements made by them, *unless the supports move also.* 7.—The entire process is the work of the *scalpellum* as a whole; the characters indicating its wedge-like action reside mainly in the "supports"; those which entitle it to be called in any sense a "saw" must be sought in the lower margins of the so-called "saws proper," those which enable it to act as a "rasp" or "comb," partly in the sides and back of the *supports*, and partly in the sides of the *saws*.

And now, to the few detailed records of observations on the operation as performed by the living insects which are vouched for by their authors as witnessed by themselves—and it is surprising how few they are; in fact, I can only cite three such records, those of Vallisnieri, Réaumur, and Newport, though I dare not deny that others may have escaped my notice—however, to these few *signed affidavits of eye-witnesses* I will add another of my own.

In the summer of 1910 I was enabled through the great kindness of a correspondent—Miss Ethel Chawner, of Lyndhurst, who has long studied the habits of these insects and immensely increased our knowledge of them, and who (I am pleased to add) is a Fellow of this Society—to observe the phenomenon repeatedly in the case of a species, viz. *Phymatocera aterrima*, Klug, whose particular method of operating, and the nature of the material on which (by preference) it works,

make it especially easy to observe its operations satisfactorily. This species is normally attached to *Polygonatum* (*anglicè* Solomon's Seal), and works by forming a continuous series of pouches situated between the outer cuticle and the inner substance of a stem, which cuticle is so far transparent that, even when the *scalpellum* has become buried under it "up to the hilt," every part of it and every movement made by it is still distinctly visible. The creature becomes so absorbed in its work that it can be taken up, stem and all, and watched even with a lens of short focus, without the least risk of frightening it, or causing it to fly away. (The species observed by Réaumur and Vallisnieri form pockets between the rind and inner substance of young rose-stems; and the former author notes that, while the instrument was actually buried in the stem, its movements could be followed by the eye no longer.) *Phymatocera* is also a much more rapid worker than *Arge*, working no doubt on more unresisting materials: so that many more repetitions of the process can be witnessed during a given time than is the case with *Arge*; and yet it works with such deliberation, that there is full time to note the different movements of the *scalpellum*, and the effect produced by each on the substances traversed by it.

Early on the morning of May 18th, 1910, the weather being at the time particularly bright and sunny, I opened a box received on the previous night from Miss Chawner, and found in it three freshly emerged ♀♀ of *Phymatocera*, and the earthen cocoons from which they had emerged during their journey—also a small stock of *Polygonatum* (leaves, flowers, and stems). I cut three stems to a convenient length, stuck them upright in earth at the bottom of a glass jar covered above with fine netting, introduced the insects into the jar, and awaited results. Almost immediately one of the insects flew on to a stem; walked slowly not quite up to (but nearly up to) its top; and then turned round, and stood quite still, head downwards. Its position was perfectly normal and symmetrical, like that of a fly at rest on a window-pane. It might have been standing to have its photograph taken! The tarsi of each leg were evenly stretched to their full length, but slightly curving so as to clasp the convex surface

of the stem transversely, the insect standing practically on the apices of its tibiae, which themselves were perpendicular to the stem. The wings were folded; the antennae evenly porrected and motionless—as indeed was the whole insect, except the apex of its abdomen—during the entire process. No part of the creature actually touched the stem, except the tarsi and the apices of the tibiae, until the work actually commenced; head, thorax, and abdomen formed, as it were, a straight line, parallel to the longitude of the stem. Presently the apex of the abdomen was moved slowly, as though in hesitation, towards the stem, till the *hairs* clothing the apical plates of the saw-sheath (*but not these plates themselves!*) appeared to touch it. I was convinced, and so still am, that these hairs were feeling and exploring the material with their sensitive tips. After a moment or two, the insect seemed to have satisfied itself that all was as it should be. The saw-sheath was again lifted into its original position, and the *scalpellum* was gradually protruded—looking exactly like the blade of a penknife as one opens it, only that its cutting edge (or rather edges) faced away from, and not towards, the handle—till it stood out at right angles to its sheath (or as nearly so as can be stated of an object which was not strictly rectilinear). Next, it was driven or pushed, not all at once but by a succession of stabs, into the stem (as a nail is by a hammer—the hammer in this case being the whole tip of the abdomen), until it was completely embedded in the stem, and the base of the saw-sheath was in actual contact with the latter, so that progress in this direction was necessarily now arrested. It did not pierce the stem *directly towards its centre*, but somewhat obliquely (on this occasion on the *right* of the insect's body, but in other cases I have seen it turned towards the *left!*). Consequently no part of the *scalpellum* became much more deeply sunk below the surface of the stem than another; and its apex was at all times as clearly visible as its base. Directly it entered the stem (the tip of the support, as I think, actually commencing the incision) the saws began to slide backwards and forwards, driving their pointed tips further and further into the material, of course in the same direction as that in which the whole

scalpellum was moving. Their advances and retreats in no way synchronised with the movements of the latter as a whole. And, so far as I could see, the movements of the two saws were independent of each other. They were certainly not simultaneous, nor did they seem to me—as both Réaumur and Vallisnieri state—to follow each other in regular alternation. My impression was that each saw from time to time encountered and overcame more or less resistance from the material, and that the pace at which they were moving varied accordingly. During its descent the *scalpellum* as a whole occasionally slightly (but only *very* slightly) altered its direction; now pressing its back, and now its sides, against the sides of the incision, and so *widening* the latter slightly in one direction or another. Thus it descended, till it was buried up to the hilt in a deep hole, or as it were a sheath, whose dimensions were practically identical with its own. At this point the *modus operandi* completely changed. Very slowly and gradually, and with occasional retreats in an opposite direction, the tip of the *scalpellum* began to move round in an arc towards the basal part of the insect's venter, the saws all the time continuing to slide, so that they were cutting their way, and were also being carried by the supports, in the direction in which the whole instrument was now rotating. The effect of this was particularly conspicuous at the mouth of the incision, which could distinctly be seen to be growing gradually into *a long clean-cut slit* (situated longitudinally as regards the stem). Meanwhile, the insect's abdomen, before quite straight, became a little hunched. Its tip, and accordingly also the base of the saw-sheath and that of the *scalpellum* itself, drew slowly more and more towards the thorax. This movement pressed the cutting edges harder and harder against the tissues which they were severing, and the slit forming the mouth of the whole incision grew longer and longer. All the while, the whole serrated and denticulate edges of the "saws" were hard at work, sliding faster and faster, and being pushed harder and harder, in the direction towards which they were advancing, by the pressure from behind, caused by the movement which the instrument as a whole was making, viz. swinging round on its pivot-like (but

moving) base further and further in that direction in which it was originally projected. Reflection will show how this movement was sure to end, and did end. The *scalpellum* ultimately worked its way towards the insect's belly till it had worked itself clear of the stem altogether, and left behind itself a more or less quadrant-shaped pouch or pocket, as deep as its own length and slightly longer at the mouth than it was deep. The sides of this pouch were scoured and torn, bleeding sap profusely, owing to the manglings which had created it—the wound, in fact, was such as would result from thrusting a spear-head into living flesh and tearing it out again, not perpendicularly but in a lateral direction.

The nidus being now completed, the insect prepared for oviposition. The hunched abdomen straightened itself out again ; and the *scalpellum* returned to its "half-cock" position, just as it stood before the incision commenced. It then re-entered the stem precisely at the point where it had first entered it, and once more buried itself up to the hilt, on this occasion naturally meeting no resistance worth mentioning, but still appearing to proceed with a certain amount of circumspection, and, as it were, to grope about with its tip, in search of the absolute bottom-corner of the pocket. This reached, a long greenish egg was extruded from near the base of the saw-sheath, entered the base of the *scalpellum*, and was gradually pushed or squeezed along its hollow interior, till it tumbled out from between the two "saws" not *at* but *just before* their apices, and so rolled into the bottom of the pocket. The *scalpellum* was immediately pulled straight upwards out of the pocket by the reascending tip of the abdomen, and the process was completed.

I should have said that the passage of the egg into the interior of the ovipositor (= *scalpellum*) was accompanied by strange and quite indescribable agitations at the base of this organ—it seemed to wriggle and rock like a cork tossing among big waves. According to both Réaumur and Vallisnieri, not an egg alone, but a drop of some viscous venom is extruded from the abdomen, for the purpose, as they suppose, of preventing the wound in the plant from healing up again. This I can neither affirm nor deny from my own observations. The

wound was undoubtedly flooded, and the *scalpellum* smeared (and perhaps somewhat clogged) by messy green semi-fluid matter. But whence exactly this proceeded I could never quite feel sure.

The first egg being thus laid, the insect at once proceeded to repeat the entire process. She walked one step down the stem, and stood exactly as at first. The tip of the ovipositor was again inserted, this time not into entirely new ground, but into the lower corner of the slit which had been made already in the cuticle; accordingly it *re-entered* the completed pocket, but at that part of it which was most distant from the corner which contained the egg already laid. This being so, if we remember that the pocket was a sort of quadrant, it will be apparent that, before the *scalpellum* could again become completely buried, it would once more encounter resistance, and would have to commence the stabbing process once again, and, in short, to start a fresh incision opening (so to speak) out of the first one. This is what it did. It stabbed its way along, till again it was buried up to the hilt in a hole of nearly its own dimensions; and then, exactly as before and by identical movements, expanded this hole into a sub-quadrant-shaped pocket: again came out of the pocket, and returned to "half-cock," etc., etc., as before described. Then followed the second oviposition, which was throughout a precise *replica* of the first. So now two eggs lay each in a little corner or nidus of its own, at an equal distance from the long clean slit which was the mouth of the entire excavation.

Another step downwards by the insect succeeded, and again as before a pocket was formed and an egg laid in it. And so the work went on without interruption for an hour and a half, while I watched it through a hand-lens of considerable power. During this time 15 eggs in all were duly deposited (all in one long line and approximately equidistant from one another), and a pocket formed to receive another. But, at this point, something went wrong. An egg was produced, but for some reason failed to enter the ovipositor, and tumbled to the ground. Thereupon the insect struck work, and my observations had to cease.

However, I had many opportunities of repeating them, both on the three insects first received (as aforesaid) from Miss Chawner, and on dozens of others which were either sent to me by her afterwards, or emerged from earth-cocoons received from the same source. The operations were always exactly similar; except that the number of eggs laid in immediate succession varied from 3 or 4 only, in some cases to as many as 20 (and possibly even more in others). The insects were indefatigable, and prolific almost beyond belief. My first three females produced more than a hundred eggs before they were three days old! All these eggs were produced parthenogenetically, and from most of them in due course came larvae, which fed and fattened on the backs of *Polygonatum* leaves (see Plate I, Fig. 2) with which from time to time I supplied them.

I found by trying a few experiments, that it made no difference whatever to the insects whether I planted the stems upright, or obliquely, or upside down. Nor did they care themselves whether they moved as they worked *upwards* or *downwards*. Two would sometimes work on the same stem at the same time in opposite directions. But they never attempted to work transversely to the stem; and though I will not stop to prove it, I think it would be easy to show that they would have been very foolish to attempt it.

Sometimes I tried them with other plants than *Polygonatum*. These were generally examined by the insects, but not approved. Sometimes, however, they consented to work on stems of *Convallaria* (Lily of the Valley), forming rows of confluent pockets in the usual way, and depositing eggs which I believe duly produced larvae. Once, also, a few eggs were laid in the usual style on some other plant. I have unluckily mislaid my original note on this; but, if my memory serves me, the plant was an *Iris*.

Once, when an insect had just completed her ovipositions, and the *scalpellum* was plunged to its hilt in a third incision, which in another moment it would have begun to widen into a pocket, a sudden idea occurred to me, and I soused the whole thing—insect, stem, and all—with pure sulphuric ether.

The insect was killed instantaneously ; without time to with draw its ovipositor, or make any movement to speak of. My object was not mere murder, but the desire to secure a pictorial record of the phenomenon as it actually takes place. A photograph which I took of it immediately afterwards (see Plate I, Fig. 2) shows clearly enough for my purpose—on a slightly larger scale—(1) the attitude of the insect itself at this stage, (2) the extended saw quite visible beneath the cuticle of the stem, (3) the long fissure which serves as a single mouth for all the pockets, and (4) even the two eggs deposited already resting each in its separate corner or nidus. (The original object is now in the Natural History Museum at South Kensington.)

Since I made these observations, I have often carefully thought them over—weighing in my own mind, or trying to do so, the real import and importance of this or that detail in the process, and asking myself what on the whole was the most reasonable view to take of the ovipositor considered as a tool. The result is that I consider it certainly not the equivalent or ideal of an ordinary saw. It is a tool of that class which do their work largely by acting as wedges—in a word by *splitting*. But it also mangles and scratches the substances worked on, and this doubtless has an advantageous result in loosening their natural cohesions and liberating fluids which the egg will require as it grows. (N.B.—The Sawfly's eggs grow considerably while *in situ*, and meantime much contraction and drying up of tissues occurs around them (see Plate I, Figs. 3 and 4). Both in form and in some of its movements the organ reminds me of certain features characterising various human tools—but rather perhaps those of the surgeon than those of the carpenter. And I should say the same of the sort of results which are achieved by it. Actual *sawing*, producing anything equivalent to sawdust or to the groove made by a normal saw, does not take place. Cutting or carving does enter into the process, but rather as an accessory than as an essential. The same may be said of the rasp-like features of certain ovipositors. They assist the work, but it could be done without them. What appears to me to be essential and indispensable

is—first the piercing-power, then the splitting-power, and lastly the lacerating-power.

These are combined in an instrument which may in certain respects resemble, but cannot be identified with, any tool employed by human artificers unless it similarly combines them. The usual comparison to a *tenon saw* is particularly unsatisfactory, as suggesting that the "support" takes no active share in the process, and also, *prima facie* at least, suggesting that it accompanies the movements of the "saws."

Finally, any notion of the tool is misleading which makes us think of it simply as a plate, or pair of plates. It is emphatically an object of *three* dimensions, and *all* must be taken into consideration before we can form opinions as to its mechanical potentialities and probable action and their consequences.

On commencing the inquiries of which this Address is the outcome I consulted, and often copied out *in extenso*, a great many descriptions of the process contained in the works of celebrated scientific authors. Looking now over these extracts in the light of my subsequent investigations, truth compels me to say that in nearly all of them a few grains of truth are combined with an immense amount of misunderstandings and misleading suggestions. Several of them make no profession to rest on any special investigation of the phenomena by their authors, but are frankly simple compilations. These I may pass over; but one or two, which have been put forth by really outstanding scientific authors as embodying truths before unknown which they have discovered in their own researches or can vouch for as having been accepted by them on sufficient evidence, contain what appear to me such misleading notions that it would be false modesty to shrink from commenting upon them. Thus, I take up two standard text-books on Microscopy, each of them the work of a justly celebrated author, a pioneer in more branches of science than one, and a Fellow of the Royal Society.

1.—One of these authors describes at great length the microscopical characters of "The Saw of the Sawfly." He gives figures, in which I believe I can recognise with confidence two portions of the organ in question as it exists in

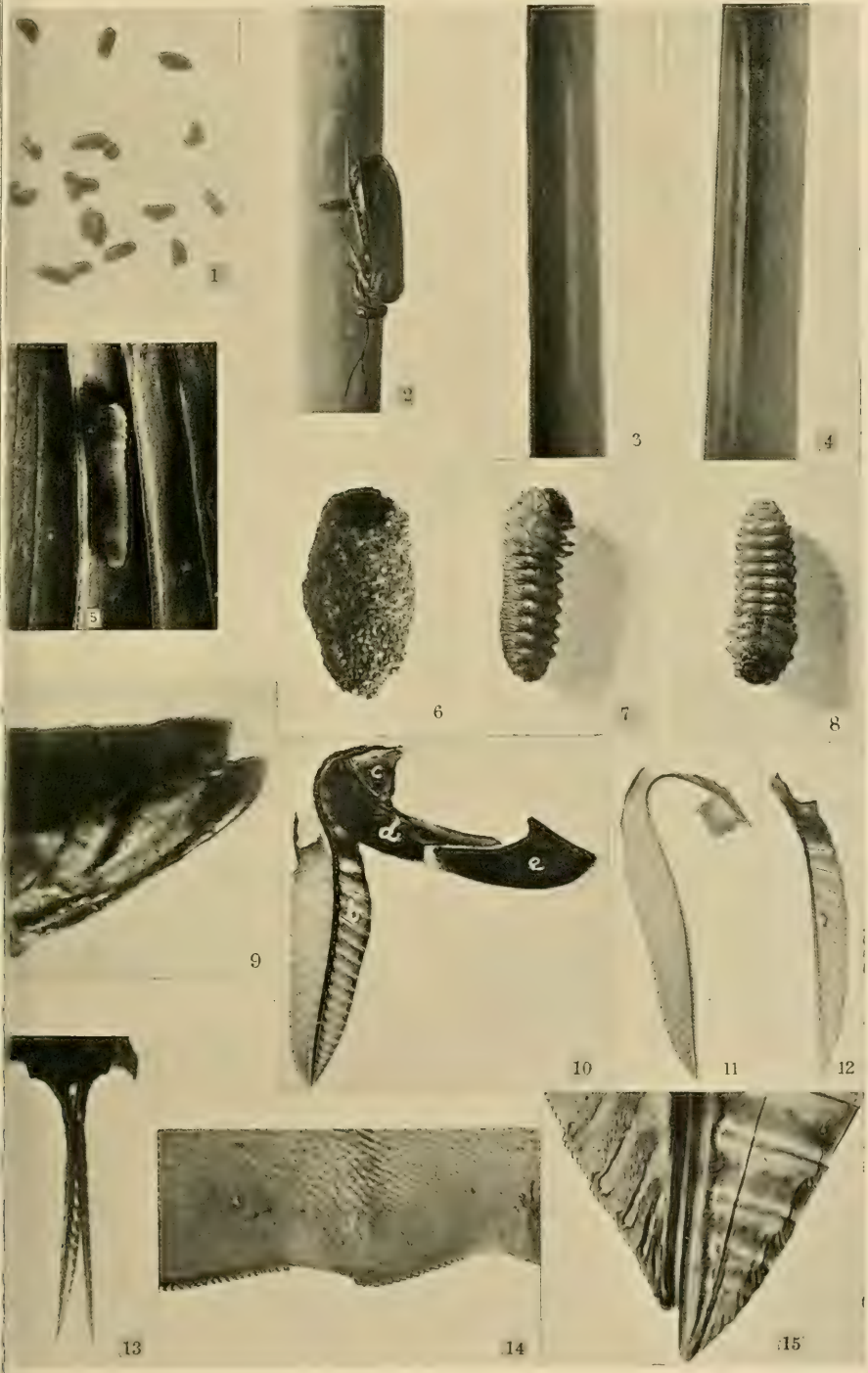
Explanation of Plate I.

All figures on this Plate refer to the same species, viz. *Phymatocera aterrima*, Kl., and are photographed from nature.

Fig.

1. Eggs removed from the abdomen of a ♀—not yet laid!
2. ♀ in act of excavating a stem of *Polygonatum*. Two eggs have been deposited, and a third excavation commenced. The saw is seen *through* the cuticle, under which it has been plunged.
3. Stem of *Polygonatum* freshly operated on, showing a long pouch under the cuticle containing eggs.
4. The same stem a few days later (more highly magnified). The stem is becoming shrivelled; the eggs have grown larger and appear as a chain of dark oval spots.
5. Young larva feeding on the back of a *Polygonatum* leaf.
6. Earthen cocoon, in which the larva pupates.
7, 8. Pupating larvae extracted from such cocoons.
9. Apex of abdomen in the ♀ imago. The "saws," etc., are enclosed in their "sheath."
10. Right half of a complete Terebra—
    a, saw; *b*, support; *c*, triangular plate; *d*, basal portion of sheath; *e*, apex of sheath.
11. A single saw viewed laterally.
12. Its support in the same aspect.
13. Saws and supports together, viewed dorsally.
14. Details of saw near its base (× about 200).
15. Apex of a saw and its support, similarly magnified.

PLATE 1 *(reproduced from photographs taken by F. D. Morice).*



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Explanation of Plate II.

Figures 1–6 belong to the sp. figured in 1726 by Vallisnieri, viz. *Arge* (= *Hylotoma*) *pagana*, Pz. (cf. Plates IV, V).

Fig.

1. Support. 2. Saw. 3. Apex of support. 4. Apex of saw. (Note the *lateral* comb-like projections, and cf. Fig. 5 !)
5. The whole excavating organ viewed dorsally.
6. The whole excavating organ highly magnified and viewed laterally—but without pressure !

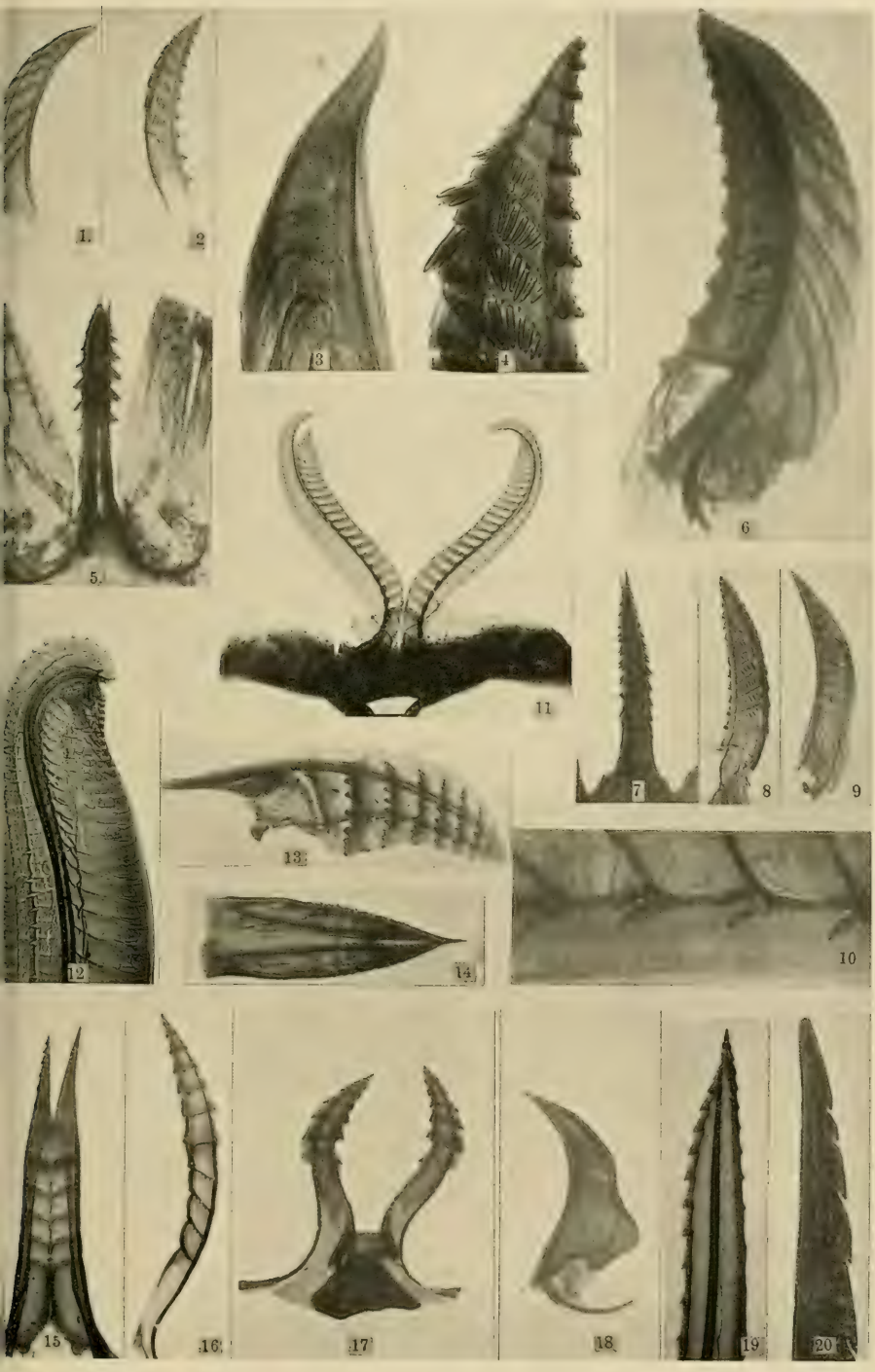
Figures 7–10 are of Réaumur's sp. figured in 1740, viz. *Arge rosae*, de Geer. (Cf. Plates VI, VII.)

7. Excavating organ viewed dorsally. 8. Saw. 9. Support.
10. Pencil-like projecting bristles on sides of the support, near its inferior margin, and springing from the "costae" which strengthen the support.

The remaining Figures illustrate various forms of the organ in different insects.

11. Saws and supports of *Abia sericea*, L., showing their basal attachments (*hypopygium*, etc.), flattened out by slight pressure.
12. Part of a saw (on left) and support (on right) of *Trichiosoma tibialis*, Leach (the sp. attached to *Crataegus!*)
13. Saw of *Lophyrus pini*, L. (Note the *distance* between the actual upper margin and the sulcate wire-like thickening which joins the saw to its support !)
14. Support of *Lophyrus pini*. L. (ventral view). (Note the great width of the organ at its base in this aspect !)
15. Supports of *Nematus abdominalis*, Pz., pressed asunder and viewed ventrally.
16. Saw of *Nematus abdominalis*, Pz.
17. Saws of *Cladius pectinicornis*, Fourcr., showing their basal attachments.
18. Supports of *Cladius pectinicornis*, Fourcr. (They are connate, practically, at the actual apex.)
19. Saw and support of *Cephus pygmaeus*, L.
20. Apex of "dart" in sting of *Apis mellifica*, L. (the Hive-bee), for comparison with the previous figure.

PLATE 2 *(reproduced from photographs taken by F. D. Morice).*



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Explanation of Plate III.

This, and the next two Plates, are photographs of Plates illustrating Vallisnieri's Treatise on the "Mosca de' Rosai" = *Arge pagana*, Pz. (all more or less reduced as to size).

Figs.

1–3 show the insect at work on rose-stems.

4 is intended to give an idea of the *minuteness* of the excavating organ.

5–6 show eggs lying in a double row in an excavation.

7–8 show eggs in different stages.

9. Larvae feeding on the leaves.

10. Cocoons formed by larvae.

11. Larva magnified.

12. Cocoons magnified.

13. Cocoon split open and viewed from behind.

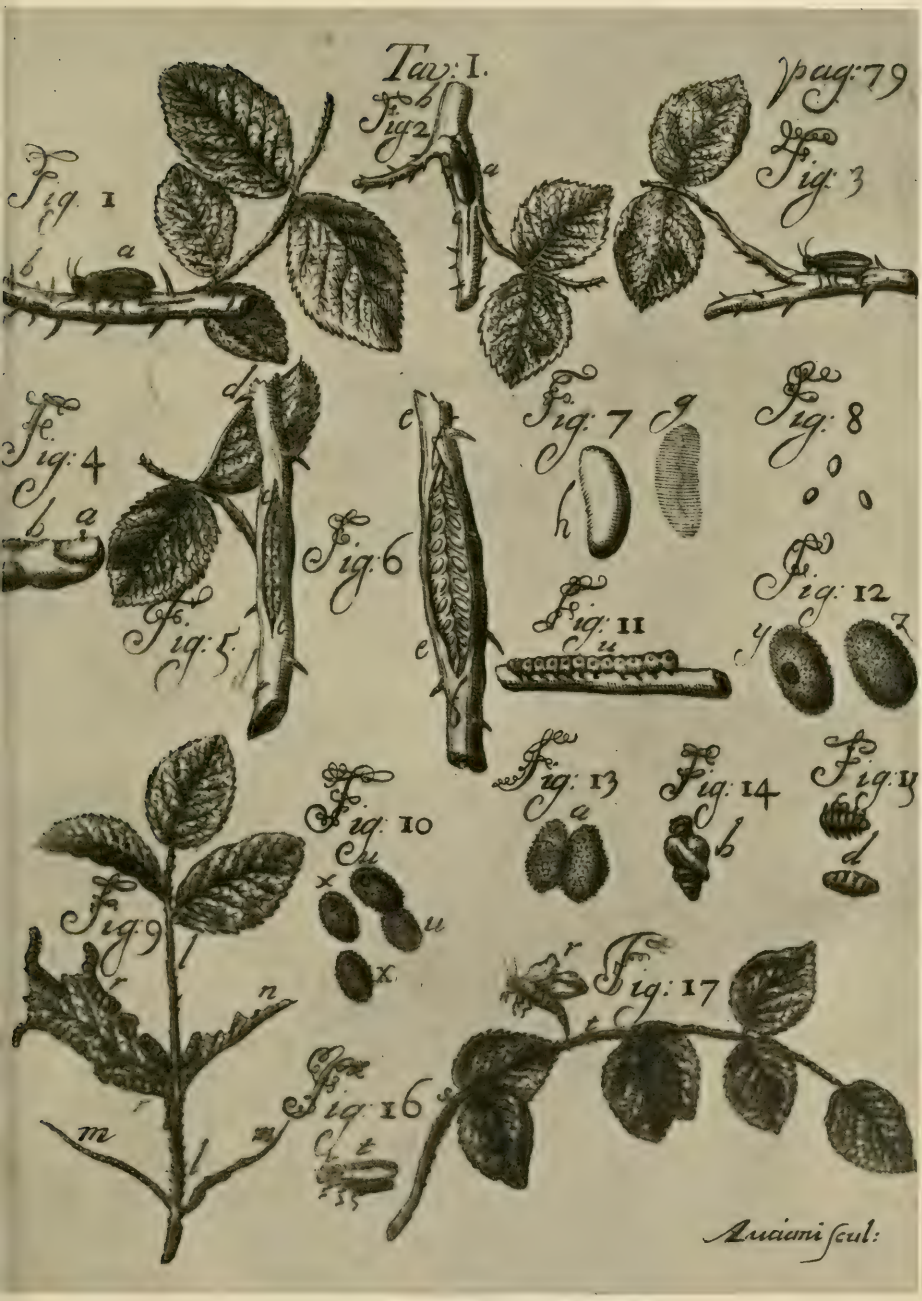
14. Pupa.

15. Cast skins.

16. ♂ of the insect.

17. Apparently some other species; ovipositing (according to the author) on the midribs of the leaves only.

PLATE 3 *(after Vallisnieri).*



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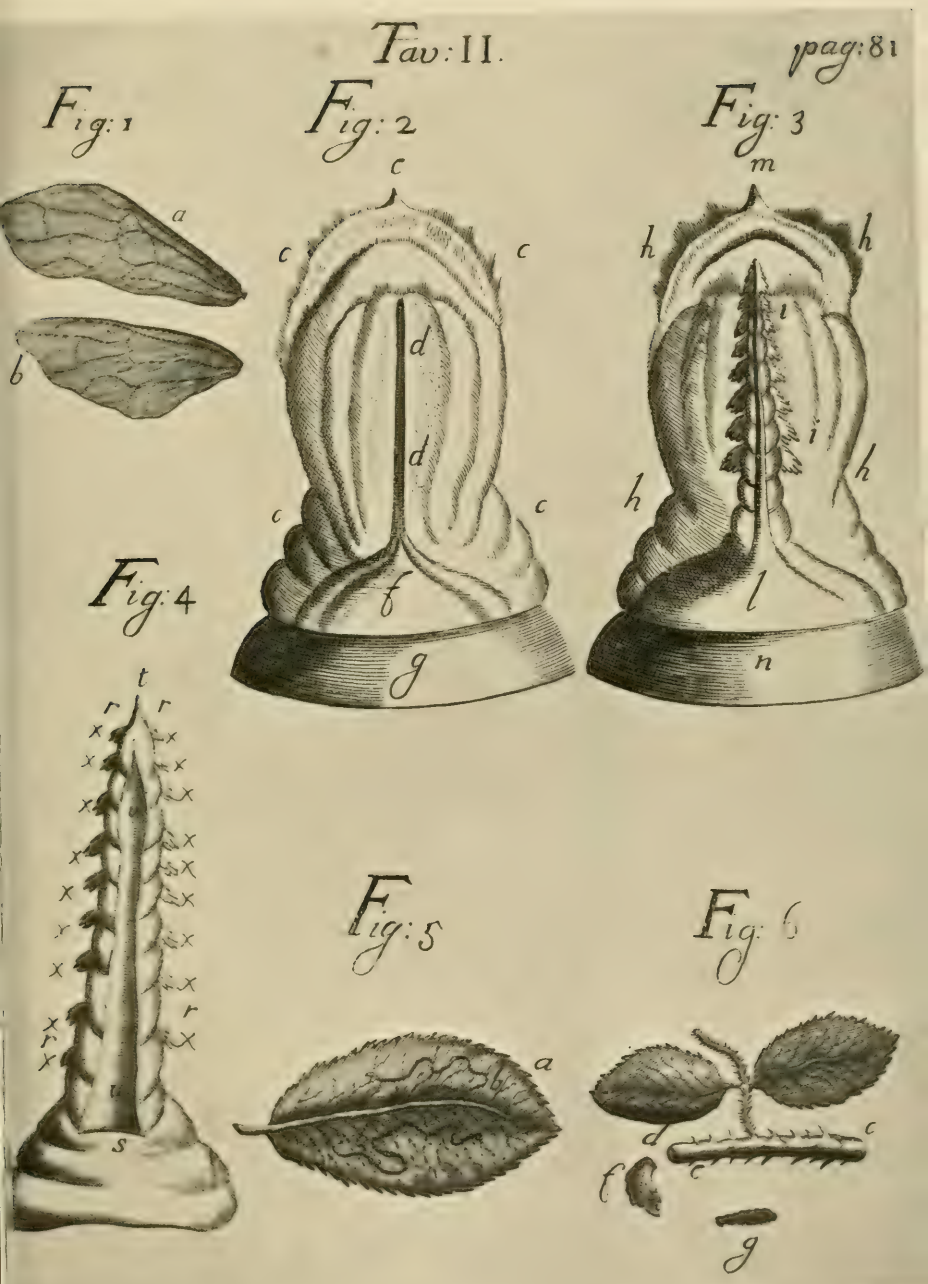
Explanation of Plate IV.

(Cf. Explanation of Plate III.)

Fig.

1. Wings of *A. pagana*.
2. Apex of abdomen viewed ventrally. Saws, etc., contained in their sheath.
3. Apex of abdomen viewed ventrally, with saws, etc., exserted.
4. Supports viewed ventrally.
5. Leaf showing tracks left by a feeding larva.
6. Cut rose-stem, within whose pith a larva has buried itself. *g* is the larva extracted. (It may be doubted whether this is the same species.)

PLATE 4 *(after Vallisnieri)*.



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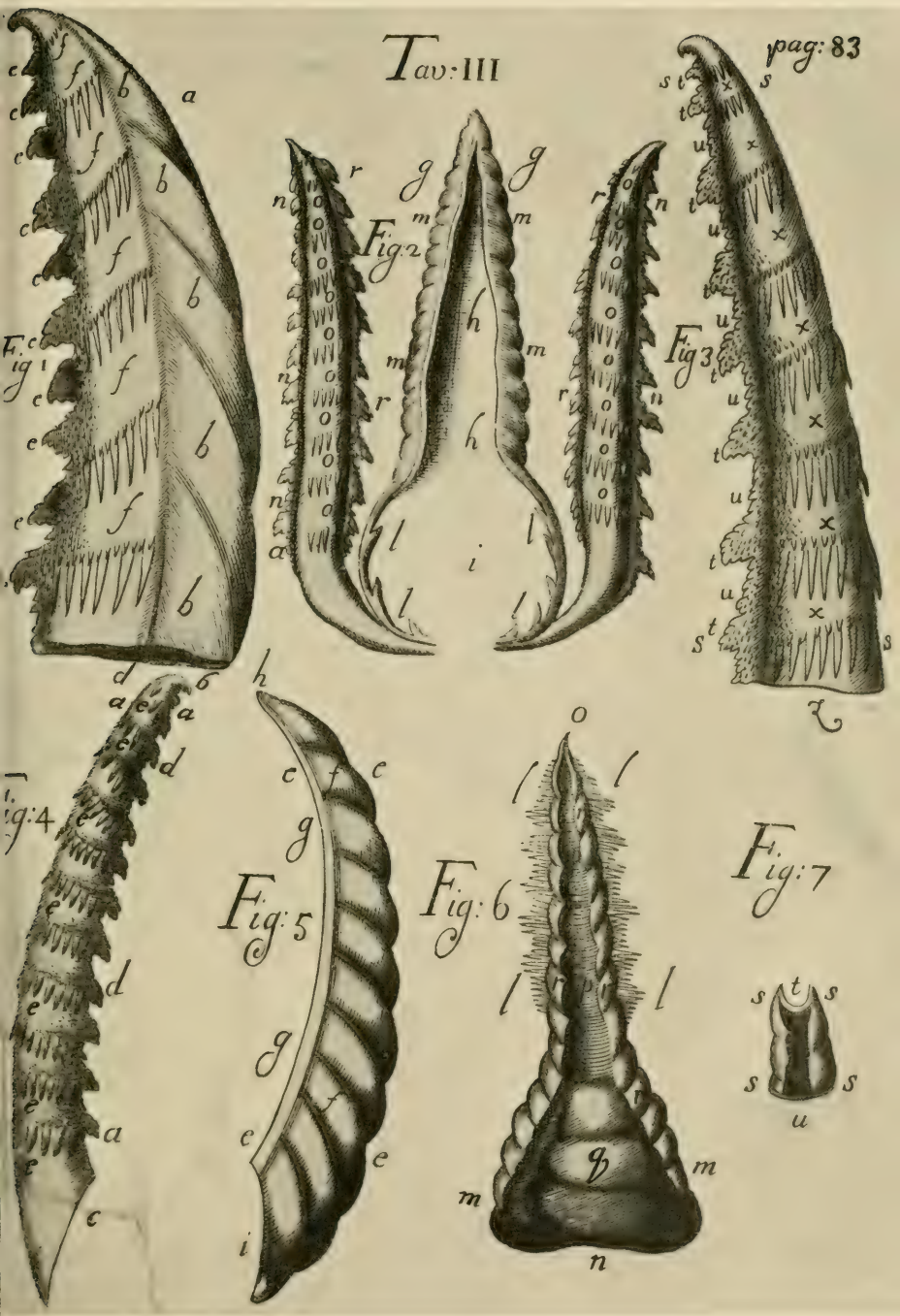
Explanation of Plate V.

(Cf. Explanation of Plate III.)

Fig.

1. Part of saw and support viewed together laterally, highly magnified.
2. Supports lying between their saws, viewed ventrally. (The artist seems to have made some error in figuring the backs of the saws, and this has puzzled Réaumur.) (Cf. his remarks on it.)
3, 4. Lateral views of the saw. (These are practically correct !)
5, 6. Supports in different aspects.
7. Section of entrance to the cavity through which the eggs pass.



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Explanation of Plate VI.

(This and the following Plate are photographs on a reduced scale from Plates in Réaumur's "Mémoires," Vol. v.)

Figs.

1, 2, 3 represent larvae of *A. rosae.*

4. Foot of a larva (magnified).

5. Cocoon made by a larva on a leaf, for want of earth in which to pupate!

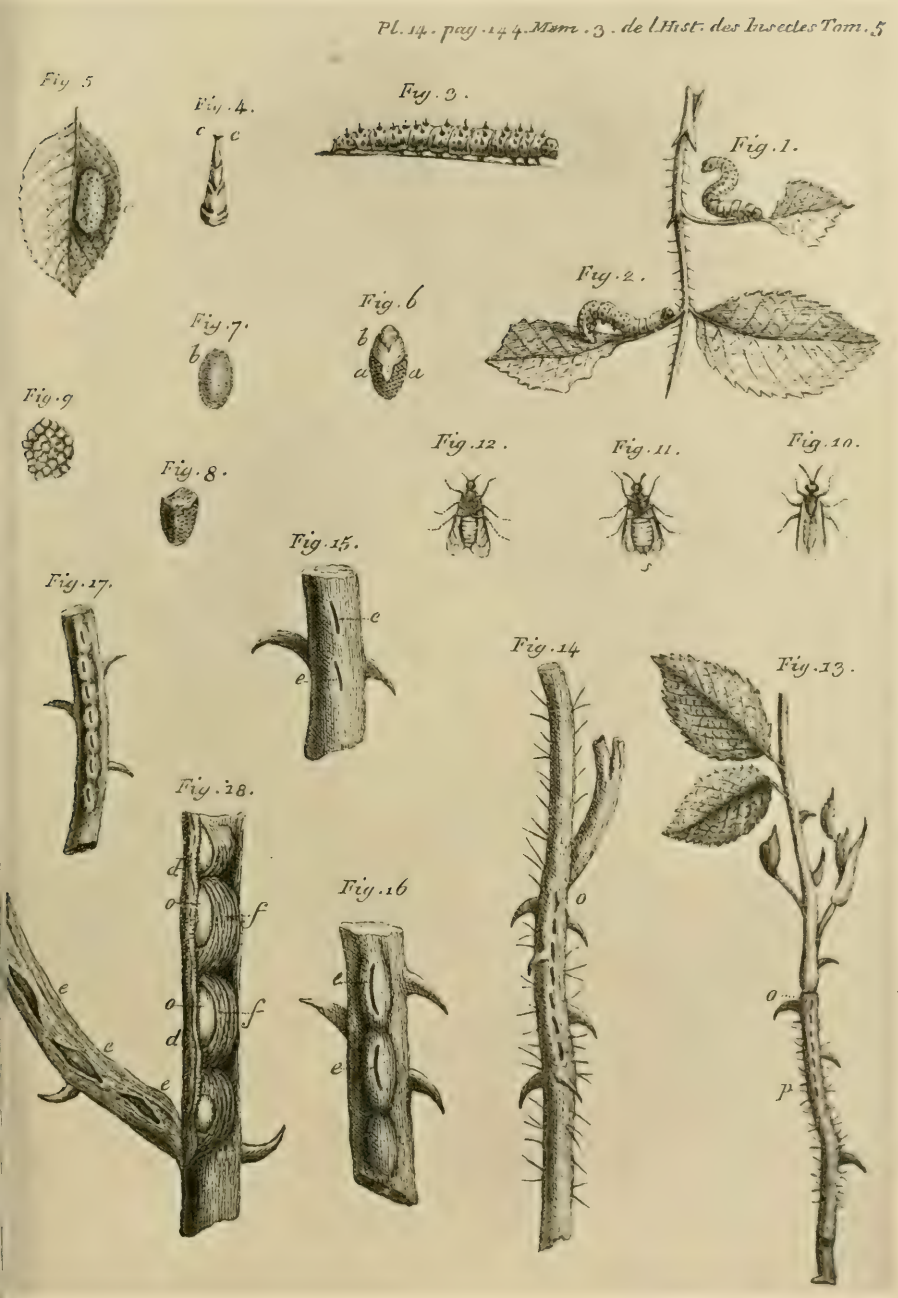
6, 7, 8. Cocoons; entire, and partially broken (intentionally) to show their construction.

9. Grains of earth forming outer shell of cocoon.

10, 11, 12. Different views of the imago (12 is a ♂).

13–18 show the excavations (and eggs in Fig. 18!) at various magnifications, and at various stages in the growth of the eggs.

PLATE 6 *(after Réaumur).*



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Explanation of Plate VII.

(Cf. Explanation of Plate VI.)

Figs.

1, 2, 3 seem to be more or less copied from Vallisnieri's figures—to show the difference between this oviposition and that of Réaumur's species. (Réaumur, however, may have taken them from nature, for he says that he had seen such eggs, but failed to discover the insect producing them.)

4, 5. Antennae of *A. rosae* (4 ♂, 5 ♀).

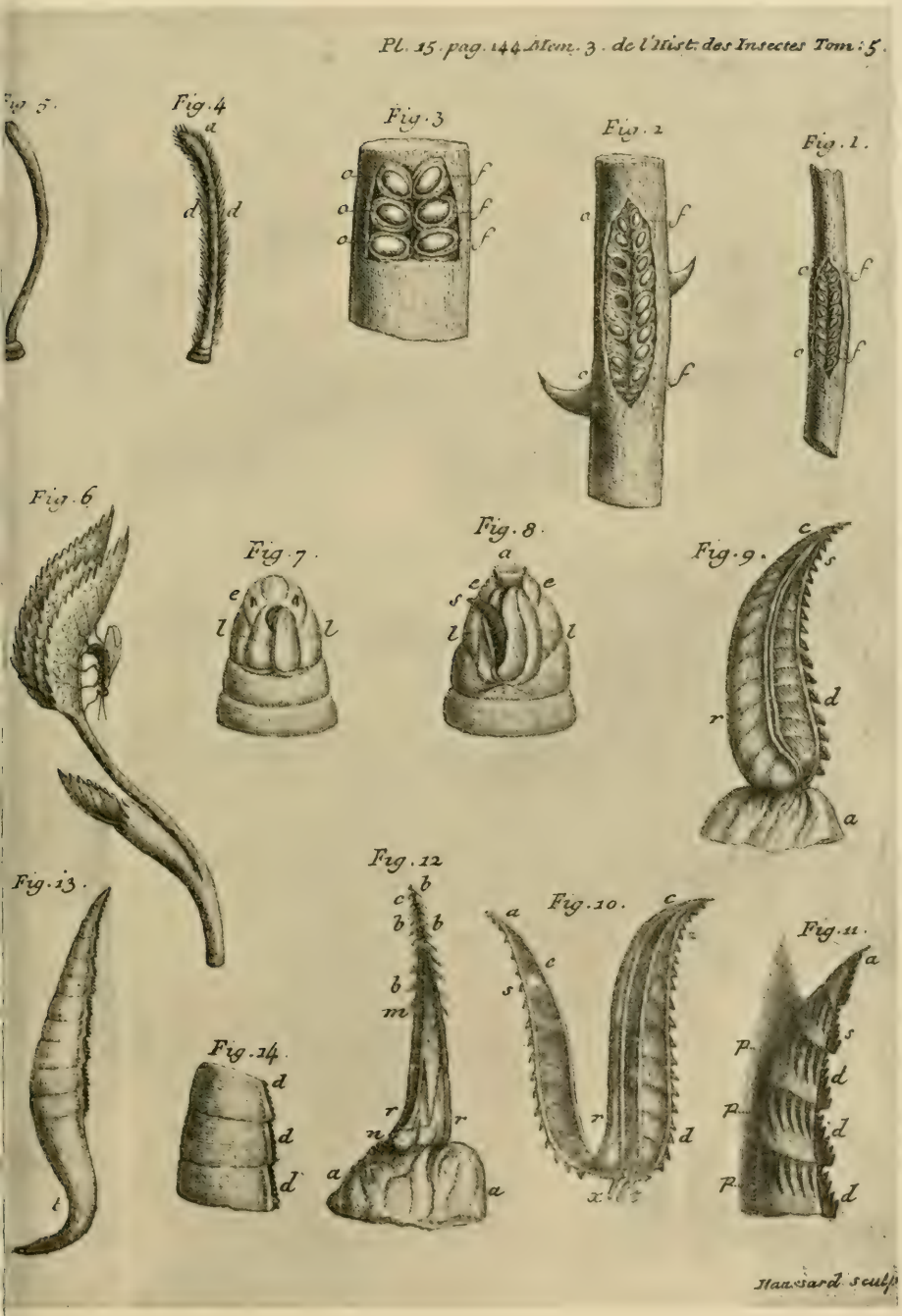
6. A different species, excavating midrib of rose-leaf. (Possibly a *Pristiphora?*)

7. Apex of abdomen viewed ventrally (saws concealed).

8. The same (but saws, etc., partly exserted).

9–12. Various views of saws, supports, etc., dissected out. (Cf. the corresponding figures in Plates V (Vallisnieri's) and II (photographed from nature).

13–14. These figures (as the author tells us) refer to some other species. I cannot identify it with confidence.



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one of our commonest British species, *Tenthredo mesomela* of Linné. He also quotes at great length from a translation of Réaumur's "Mémoires," and proceeds to notice phenomena which he believed that author—and indeed all others—to have overlooked.

The true saw, he tells us, is not the object commonly so called; but another, as yet undetected, and figured by him now for the first time. What has been called the saw is only a sheath, in which the real saw is enclosed during quiescence. He describes minutely such characters of this object as are visible in the lateral view of it, and explains how, precisely, it is adapted to the functions which he assigns to it.

Now—will you believe me?—this previously undiscovered "true saw" is simply one of the "supports." It had been figured and described quite adequately both by Réaumur and Vallisnieri. And the edge of it which the later author supposes to be its cutting edge, is that which is at all times in contact with the upper margin of the veritable cutting-instrument, and is consequently *out of contact with the materials which it is said to act upon!*

2.—The mistakes of the other author are not of his own making. But he lends his great authority to support a strange notion imparted to him by an entomological friend. He tells us that this friend had watched repeatedly the operations of Sawflies, and had found out that Réaumur and others were mistaken in supposing that the eggs travel through the instrument which makes the incision. The latter instrument, he says, after making its incision is immediately re-enclosed within the sheath, and so remains while another quite distinct organ—the real ovipositor—is protruded from the abdomen, conveying with it an egg, which it guides into its proper position.

As to this I can only say that I have never seen a *scalpellum* re-enter its sheath between the two operations of excavation and oviposition; that I have watched again and again an egg enter and pass through the *same* organ which had prepared just before, a receptacle for it; and that, after dissecting literally hundreds of Sawflies belonging to various genera and species, I have never found anything in the least resem-

bling the supposed independent ovipositor. An ovipositor other than the *scalpellum* does not exist, and I cannot conceive what the observer can have mistaken for one.

3.—Burmeister's well-known "Manual" (p. 197 of Shuckard's Translation) makes statements not unlike those just discussed. "The *terebra*," he says, "does not pierce firm substances, but merely guides the eggs into already existing cavities; but the aculeus forms the cavity itself for the egg, pierces into bodies not firmer than itself, and as a defensive instrument it wounds very severely." On this I would remark, in addition to what has been said above, that it is exceptional among the Hymenoptera to use the aculeus as a defensive weapon; and that such as habitually so use it, viz. the social Bees and Wasps, do *not* also employ it to form cavities for receiving eggs.

4.—The ambitious, and in many respects very excellent, monograph of Lacaze-Duthiers inquires, with much detail and many figures, into the morphology and homologies of the *terebra* and its parts; but the author can hardly have witnessed its actual operations. For he insists that the blades commonly called the saws must obviously, like an ordinary saw, be applied to the substances they have to sever *edgewise* and not like an "aculeus" *point first.* The instrument, he says in so many words, "does not make a hole but a slit." I hope I have convinced you that it does both!

5.—Lastly, in the 8th edition of a well-known work by the justly celebrated American Entomologist and late Honorary Fellow of our own Society, Professor Packard, I find an account, in which, taking it simply as it stands, I can positively discover no sort of meaning whatever. Its words are these—

> The ovipositor or saw consists of two lamellae the lower edge of which is toothed and fits in a groove in the under side of the upper one, which is toothed above, both protected by the usual sheath-like stylets.

How two lamellae can have two edges, a lower and an upper one, which are fitted together in a groove; and what is meant by the under side of an upper edge; and how a tool could act when its toothed edge was enclosed within a portion of itself,

to me at least is altogether inconceivable. I cannot help suspecting that the author's real meaning has suffered a total eclipse, through some accidental omission or transposition of words during printing, which has converted an intelligible though evidently somewhat inadequate account into simple nonsense.

I have now only to crave your indulgence for unintended but doubtless unavoided deficiencies in this Address—omissions, superfluities, errors as to fact, faults of judgment or faults of taste, things that might better have been said otherwise, or on another occasion, or not said at all. Also I must acknowledge the kindness of many friends and colleagues, whom I have troubled in various ways with my doubts and difficulties, especially when I first took up the matter, and was discovering mares' nests in every possible direction. Above all I must thank Miss Chawner; and I hope to show my gratitude in deeds rather than in words by worrying her on many future occasions for such help as has been so valuable to me on the present occasion—or, I should say rather, so altogether invaluable.

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TRANSACTIONS

OF THE

ENTOMOLOGICAL SOCIETY

OF

LONDON

FOR THE YEAR 1911.

I. *On the Forms and Geographical Distribution of* Acraea lycoa, *Godt., and* Acraea johnstoni, *Godm.* By HARRY ELTRINGHAM, M.A., F.Z.S.

[Read June 1st, 1910.]

PLATES I, II.

AT a meeting of this Society on June 6th, 1906, a paper was read by Professor Poulton, in part dealing with the mimetic forms of *Acraea johnstoni*, Godm.* In this paper the author sought to show that judging from the outward characteristics, *Acraea lycoa* of West Africa gradually merged by intermediate gradations into *Acraea johnstoni* of the east and south, the subject being considered with special reference to the remarkable series of mimetic modifications presented by the latter species. The final conclusion then attained emphasised the extreme probability that the whole series of forms then associated under the names of *A. johnstoni*, *A. proteina*, etc., must be regarded as specifically identical with *Acraea lycoa*.

In order that the true affinities of this complicated association may be more accurately established, I have, at Professor Poulton's suggestion, undertaken a microscopical examination of the minute structure of the forms. I have examined the whole of the material in the Hope

* "Mimetic Forms of *Papilio dardanus* (*merope*) and *Acraea johnstoni*," E. B. Poulton. Trans. Ent. Soc., p. 281 et seq., 1906.

Department, the National Collection, and the Tring Museum, comprising some hundreds of examples, and have made a large number of microscopical preparations, with results which it is the purpose of the present paper to describe.

As a preliminary it seems desirable to give some account of the known forms and the present state of their synonymy.

Acraea lycoa.

Acraea lycoa was described by Godart in 1819 (Enc. Meth.) from a female example, and the author stated that it was not known whether the sexes were alike. The first reference I can find to the male is in Staudinger's "Exotische Schmetterlinge," where the difference between the sexes is mentioned. Fig. 2 on Plate I shows the typical western female drawn from an example received from Sierra Leone, whilst fig. 1 shows a male from Oguta, Nigeria. In the female the depth and richness of the ground-colour varies somewhat, though it is in practically every case paler than in more eastern forms. The male is frequently semi-transparent, and the forewing spots may be only very faintly discerned. Examples from Accra and Nigeria present no distinct modifications from the extreme western forms. The first recognisable change is observable in males from Fernando Po. These resemble fig. 1, but the spots on the forewings are now quite distinct, and of the same pale reddish colour as the discal area of the hindwings, and the whole ground-colour is somewhat darker. The females are still like fig. 2, but with darker ground-colour. These forms persist over a large area, extending without marked variation from Fernando Po, through the French Congo, and across the Congo State to Toro in S.W. Uganda. At Toro several varieties may be found, since it is here that three geographical races appear to meet. From this point the species spreads north and south. Between Lake Victoria Nyanza and Lake Kivu (Mt. Niragonwe) the males resemble fig. 3, whilst fig. 4 shows a female from the same locality. To the north of Toro in the Unyoro Region the male is modified in a somewhat different manner. As fig. 5 shows, the forewing spots have become much smaller and more clearly defined, though there is much less development of the hindwing patch than in the

Niragonwe specimens. This form of the male is very typical of Western Uganda. The females are not, however, distinguishable from those of the more southern Urundi District, all being characterised by the extreme paleness of the hindwing patch. Passing round the north shore of Lake V. Nyanza and on towards the south to the Tiriki Hills this hindwing patch becomes more distinctly yellow, whilst the males have developed the same feature, accompanied by a darker ground-colour and greater distinctness and depth of colour in the forewing spots. The male of this region is shown at fig. 6. Passing southwards and eastwards we find at Kilimanjaro the two sexes present much the same pattern, but the ground-colour in both sexes is now very dark, the forewing spots in the female are smaller, and the hindwing patch is slightly expanded again. The sexual dimorphism is still well marked. Fig. 7 shows a female of this form which is equivalent to the "*Planema*" *fallax* of Rogenhofer, and the *Acraea kilimandjara* of Oberthür. The species has developed to its maximum extent in mimetic approach to *Amauris echeria* and *A. albimaculata*. Northwards, in the district of Mt. Kenia, examples still resemble *fallax*, but in several specimens the hindwing patch has a slightly edentate distal outline between the third median and the radial, giving the insect a marked resemblance to *A. johnstoni* f. *confusa*. In two males from this district the forewing spots are distinctly paler than the hindwing patch, and up to this point in the geographical range of the species this is the only sign of departure from a hitherto consistent sexual dimorphism. This Kenia form resembles fig. 7 on the upperside with the exception of the slight difference in the hindwing patch, but the insect is generally somewhat smaller. I have figured it in monochrome on Plate II, fig. 7. On the underside the difference is more marked. In *fallax* the ground-colour of the forewings is dark sepia from the base to the inner side of the white subapical spots, the whole apical area being dusted with pale ochreous. In the Kenia form the dark colour extends beyond the first three subapical spots, and the whole of the underside has a generally blacker appearance than in *fallax*. These forms are of exceptional interest, and are amongst the many valuable specimens for which the Hope Department is indebted to the generosity of the Rev. K. St. A. Rogers and Mr. and

Mrs. S. L. Hinde. The species further extends northwards into Abyssinia, and there we find that both sexes are alike, not having, as the Kenia specimens might lead us to expect, white forewing spots, but having all the lighter markings dark ochreous. This form is the subspecies *A. lycoa aequalis* of Rothschild and Jordan, represented at figs. 8 and 9. It is worthy of note that the Abyssinian form *steckeri* of *A. echeria* is specially characterised by dark ochreous markings and an entire absence of white spots. It is doubtless in mimicry of this form that the female *lycoa* of this region has lost its white markings.

With regard to the existing nomenclature of the above forms, the *lycoa* of Godart applies to the species throughout its range until we arrive at Entebbe, and from thence eastward and southward the forms approach more and more closely to the *fallax* of Rogenhofer, which is identical with Oberthür's *kilimandjara*. In his catalogue of the African Rhopalocera Aurivillius makes the queried suggestion that *fallax* may be a form of *johnstoni*, but this I hope to show is an incorrect surmise. The same author refers to an example described as a variety of *lycoa* by Butler, and names it ab. *butleri*. The supposed identity of this variety with *lycoa* must be regarded as an error. From an examination of the specimen there can be no doubt that it is a female example of the form subsequently described by Grose-Smith as *Acraea toruna*, the position of which will be considered later.

Acraea johnstoni.

Acraea johnstoni was first described by Godman in 1885 (P.Z.S., p. 537) from a male example, and the type agrees with the form subsequently described by Oberthür as *Acraea proteina semifulvescens*. Now that long series of the forms of *A. johnstoni* are available, it is seen to be somewhat regrettable that this form should have acquired the position of the type, since it is in reality a rather rare variety. In 1889 Butler described an *Acraea*, which he assigned to the type of *Acraea johnstoni* as its female, and this arrangement was confirmed by Dr. Holland in 1893 (Ann. Nat. Hist., p. 248). In 1891 Rogenhofer described his "*Planema*" *telekiana*, which, however, is only a form modified but slightly from Godman's type of the male *johnstoni*. The hindwing patch is somewhat

tawny in *telekiana*, whilst it is whitish in the male type of *johnstoni*. The same author described at the same time "*Planema*" *confusa* and "*Planema*" *fallax*. The latter has already been referred to in connection with *lycoa*. *Planema confusa* is described by Rogenhofer as the male of Butler's type female. In Baumann's "Usambara" (supplement) it is stated that both the male and female were taken. No difference is specified, and the figure subsequently published is stated in the text to be that of a female, though the description facing the plate states it to be a male. In 1893 M. Oberthür described a number of forms under the name of *Acraea proteina*, the type of which appears to be a male,* and resembles the insect previously described by Butler as the type female of *johnstoni*, and is also similar to Rogenhofer's *confusa*. The four varieties described by Oberthür are (1) *proteina flavescens*, which appears to be an ordinary yellow-spotted example of the commonest form of *johnstoni*; (2) *proteina semialbescens*, sex not stated, an example of which in the National Collection has white spots on the forewing, and tawny hindwings marked with dark inter-nervular rays and exhibiting no trace on the upperside of the quadrate patch, though the latter is clearly outlined on the underside; (3) *proteina semifulvescens*, sex not stated, a form which agrees with Godman's male type; (4) *proteina fulvescens*, a form which has nearly lost the spots in the forewing and the patch in the secondaries, though they are more obvious on the underside, and all four wings are tawny. It is the peculiar variety which appears to have developed in a mimetic direction synaposematic with *Danaida chrysippus* f. *dorippus* and *Acraea encedon* f. *daira*.

The next published reference occurs in Butler's note on the forms in Proc. Zool. Soc., p. 113, 1896. Butler was unaware that the pattern of Godman's male type also occurs in the female sex, and therefore he regarded Godman's type and his own female type as constituting a sexually dimorphic variety. He describes Oberthür's *fulvescens* as synonymous with Rogenhofer's *telekiana*, whereas the latter is practically the same as Godman's male type, and further he

* Butler appears to have thought that Oberthür's *proteina* was a female. Though the sex of the specimen figured is not definitely given as male, the author states, after describing it, that his collection contains three males, quite similar to one another. I cannot take this to mean otherwise than that the example figured is one of the three males in question.

makes Oberthür's *flavescens* synonymous with the same author's *kilimandjara*, Rogenhofer's *confusa* and *fallax*, and Karsch's *octobalia*. The latter appears to be an aberration of *johnstoni*, in which the yellow spots are ringed with a darker colour.

I have lately examined in the British Museum a very curious example of *johnstoni* from Kilimanjaro. It resembles the *fallax* form of *lycoa* so closely that I hesitated to decide its identity from the external features alone. Mr. Heron kindly allowed me to examine the genitalia, and it proved to be *johnstoni* as above indicated. The quadrate appearance of the hindwing patch is almost lost on the upperside, though rather more developed beneath. Placed side by side with the forms of *lycoa* from Kenia above described, the two species would certainly be difficult to distinguish.

The last form of *johnstoni* which I have seen described is the *Acraea toruna* of Grose-Smith. It presents certain peculiar features, and will be considered apart from the other forms.

I have endeavoured throughout the foregoing somewhat tedious explanation to distinguish between forms which appertain to *lycoa* and those which are conspecific with *johnstoni*, because, as the result of my investigation, I am convinced that *lycoa* and *johnstoni* are separate species, and remain so throughout the length of their geographical range. That of *lycoa* has already been outlined. *Acraea johnstoni* occurs in the Tiriki Hills and extends as far south as Chirinda in S.E. Rhodesia. In this latter locality all the examples I have seen, some twenty in number, are of the *confusa* form (including *flavescens*). The spots and hindwing patch vary from yellow to white. In some cases the specimens have all white markings. Plate I, fig. 15, shows a female from this region.*

* Since the above was written I have had an opportunity of examining a fine series of *Acraea johnstoni* taken in Nyassaland by Mr. S. A. Neave. There are forty-five of the *confusa* form, varying from yellow to white spotted, the only combination not represented being white hindwing patch and yellow forewing spots. One example has white forewing spots and dark yellow hindwing patch (= *semi-albescens*). There are, in addition, four examples of a peculiar form of *semifulvescens* in which the forewing spots are not obsolescent as is usual in this form, but are as white and distinct as in *confusa*. The examples are all males. They have a striking appearance and form an interesting connecting link between *confusa* and *semifulvescens*.

The specific identity of all the forms of *A. johnstoni* would, I think, with the exception of the *toruna* form, be quite satisfactorily established on the external features, but apart from my own examination of the genitalia, we have still further direct proof. In the Tring Museum there is a family of *A. johnstoni* bred from ova at Nguelo, Usambara. To which variety the parent belonged I have been unable to ascertain, but the nine offspring consist of the following:—

Three examples of the type form (= *semifulvescens*), two males and one female. The latter is shown at Plate I, fig. 12. The males are slightly smaller, and have the hindwing patch very faintly ochreous, and one has the forewing spots much paler.

Four examples of the *fulvescens* form, two males and two females. One of the latter is shown at Plate I, fig. 11. The males resemble this female, but the remaining female is somewhat intermediate, having the spots paler, and a considerable powdering of black scales at the base of the wings and about the inner angle of the hindwings.

One black and white female shown at Plate I, fig. 13. This form occurs very commonly at Chirinda, and I have also seen a similar specimen from Mombasa.

One male shown at Plate I, fig. 14. This example is nearest to the commonest variety of the species (= *confusa*).

Acraea toruna, Grose-Smith.

We may now consider the position of *Acrea toruna* in relation to the foregoing species. The ground-colour, especially in the forewings, is more profoundly modified than in any of the other forms. Whilst the present position of the forewing spots may be traced from *johnstoni* f. *confusa* through the typical male *johnstoni*, the distal outline of the hindwing patch is much less angulated than in other *johnstoni* forms, at least on the upperside, a fact doubtless due to the close approximation of its pattern to that of its model *Planema latifasciata*. One feature stands out prominently, the palpi are nearly always entirely black,* whereas in all the forms of *johnstoni*

* I have to thank my friend, Mr. F. A. Heron, for first calling my attention to this feature. It is interesting to note that the genus *Planema* is distinguished by the possession of black palpi, though there is also in that genus a white lateral streak.

and *lycoa*, and in fact in all other African Acraeas which I have examined the palpi are yellow beneath. I have examined three interesting examples of *toruna* in the Tring Museum taken near Bukoba, between Lakes Kivu and Victoria Nyanza. In one of these the hindwing patch is pure white and the palpi have numerous yellow scales beneath, thus providing a transitional form from *semifulvescens*. The second of these specimens is very abnormal, and has the ground-colour of the wings brownish black with just a slight suffusion of the characteristic reddish chocolate colour in the neighbourhood of the distal end of the forewing cell. The hindwing patch is white, and bears on the upperside hardly a trace of the quadrate distal outline. The third is of the normal colouring, but the forewing spots are very much reduced in size, that between the first and second median being represented by a mere streak, and the subapical band of spots is only about a quarter of the usual width. All these examples are males. The second specimen above described has decidedly the appearance of a form intermediate between *toruna* and a female *lycoa*, and in the absence of an examination of the genitalia would provide a strong temptation to be regarded as a connecting link between the two species.

As will presently be described the male genital armature of *toruna* presents no features by which that variety can be distinguished from the other forms of *johnstoni*, and I am satisfied that *toruna* is merely a geographical race or subspecies of *A. johnstoni*.

The Distinction between *A. lycoa* and *A. johnstoni*.

It now remains for me to give some account of the features which lead me to assign all the forms of *A. lycoa* and *A. johnstoni* to two distinct species, albeit including certain subspecies or geographical races. In the first place *A. lycoa* is sexually dimorphic, and remains so throughout its range with the exception of the peculiar Abyssinian subspecies. In *A. johnstoni* all the numerous varieties occur in both sexes. The modifications of pattern which take place in *lycoa* as we pass from west to east tend in one definite direction only, viz. away from the resemblance to western black and white *Planema* and *Amauris* models and towards a superficial resemblance to the eastern and southern Danaines *Amauris*

echeria and *A. albimaculata*, together with a synaposematic approach to the *confusa* form of *A. johnstoni*, especially developed at Kilimanjaro and on the Kikuyu Escarpment. Throughout its range and variations *lycoa* presents a pale discal area in the hindwing, which, though varying from white to yellow and showing a very ill-defined outline in males from the extreme west, nevertheless has, except in some examples of the *fallax* and Mount Kenia forms, a well-rounded distal outline. In *lycoa* the basal spots of the hindwing underside are almost always smaller and less confluent than in *johnstoni*, though this feature is somewhat variable. A careful examination of the neuration in *lycoa* and *johnstoni*, shows the following differences (see Plate II, figs. 4 and 5). In the forewing of the former, the lower discocellular nervule is nearly always rather shorter and lies in a more nearly transverse direction than in *johnstoni*. This feature is also subject to slight variation. The hindwing cell presents a difference in the two species, and owing to the pale colour of the scales in this area the difference can be more readily seen. In *lycoa* the cell has a generally broader and shorter appearance than in *johnstoni*. This effect is produced to a great extent by the fact that the middle discocellular nervule is outwardly more deeply concave in the latter than in the former. This feature is fairly constant, and is quite evident in the examples from Kenia referred to above. The most conclusive test of specific distinction is, however, to be found in the structure of the male genital armature. I have made a large number of preparations from examples occurring throughout the range of the two species and from the different varieties, and have also examined many others not actually dissected out and mounted. The accompanying plate gives outlines of the neuration, and also drawings of the male genitalia of *lycoa*, *johnstoni*, and *toruna*. Fig. 1 shows the appearance of the first, and fig. 2 that of the second. The claspers are for the most part shorter and stouter in *lycoa* than in *johnstoni*. The penis is comparatively short, frequently showing a kind of bilobed structure, and is not a continuous tube, but is widely grooved towards its extremity. The uncus is comparatively very short, obtusely pointed, and bears a small process on each side. In *johnstoni* the penis is long and slender, it does not show a bilobed structure, and though it is grooved like that of *lycoa*, the

walls are less widely separated. It is in the uncus, however, that the greatest difference is shown. It is produced dorsally into a long curved extremity, somewhat hollowed beneath, and slightly widened laterally at its termination. Whilst all the forms of *lycoa* from its western type to its most extreme modification in the Abyssinian subspecies present no noticeable change in the structure of these organs, so all the forms of *johnstoni*, from the typical male to *confusa* and *fulvescens*, and the subspecies *toruna*, show the same form in the male genitalia, especially characterised by the extremely long uncus and slender penis. That these features are of specific value I have no doubt, since I have also made preparations of the genitalia of other nearly allied *Acraeas*, and find that they present features which I need not here specify further than to say that they are entirely different and characteristic.

The male genitalia of the *toruna* form shown at fig. 3 afford little or no distinction from those of *johnstoni*. The claspers appear to be more distinctly lobed, but this is a variable feature, and is found more or less developed in some examples both of *lycoa* and *johnstoni*. The details of the articulation of the claspers with the vinculum are apparently rather different, though this point is not at all reliable in a microscopic specimen, as the appearance often varies with the point of view. The penis certainly exhibits a similar formation to that of *johnstoni*, and differs in the same degree from that of *lycoa*. The uncus is similar to that of *johnstoni*. There can be no doubt that *toruna* is as distinct from *lycoa* as is *johnstoni*, and further, that so far as the genitalia are concerned, it is indistinguishable from other forms of *johnstoni*. It appears to be rare, and is certainly a local form and, as already stated, I think it must be regarded as a geographical race or subspecies of *johnstoni*.

Finally, we are now acquainted with the larvae both of *A. lycoa* and *A. johnstoni*, and it will be of interest here to compare them.

The larva of *A. lycoa* is figured by Aurivillius (Ent. Tidskr., Plate 5, fig. 2, 1893), and is thus described :—

"The larva is yellowish without markings, with black head and black spines. The thorns are scarcely as long as the diameter of the body." The figure shows the larva as having all the spines black, including those of the sublateral row, whilst the body has no rings or markings of any

kind. From a preserved specimen in the Tring Museum the larva of *A. johnstoni* may be described as follows:—

Body yellowish beneath and brownish black above, each segment with a ring of yellowish white, edged with brown and divided in the middle by a dark brown line widened somewhat at the base of each of the papillae which carry the spines. Head black, and the first and last three segments ventrally somewhat darker than the remainder. Twenty-four dorsal black spines arranged in a double row. Eleven lateral spines on each side, the last two projecting backwards. Eight sublateral *yellow* spines on each side, the first pair arising from the fourth segment (Plate II, fig. 6).

The principal differences distinguishing this larva from that of *lycoa* are the dark-coloured dorsal area, the alternation of dark and light rings and the colour of the sublateral row of spines.

Synonymy of the forms of *A. lycoa* and *A. johnstoni*.

Having now established the specific differences between *A. lycoa* and *A. johnstoni* it remains to arrange the various forms in accordance with the facts enumerated. The varieties of *A. lycoa* fall naturally into several geographical races or subspecies, and it will therefore be convenient to give them subspecific names. In the case of *Acraea johnstoni* only one such geographical distinction can be clearly discerned, viz. that of the variety *toruna*. Since the form of *A. johnstoni* which must be taken as the type (= *semifulvescens*, Oberth.) occurs in both sexes, I would suggest that for the sake of uniformity, and without implying the slightest discourtesy to Mr. Butler, that the latter's female should be assigned to Rogenhofer's *confusa*. The *flavescens* and *semialbescens* of Oberthür are not conveniently distinguishable from his *protcina* and Rogenhofer's *confusa*. Oberthür describes the forewing spots in *protcina* as white or pale yellow, in *flavescens* as yellow, and in *semialbescens* as white. All these variations may be observed in long series, such as those from the Chirinda District collected by Mr. C. F. M. Swynnerton and Mr. G. A. K. Marshall. In this neighbourhood all the examples of *johnstoni* appear to be of the *confusa* form, whereas the latter occurs in company with the type

(= *semifulvescens*) and also with *fulvescens* at Kilimanjaro. Although at Chirinda *johnstoni* does not appear to produce some of the varieties which occur elsewhere, and as suggested by Prof. Poulton, appears to be influenced in its pattern by *A. lobengula*, I can find no constant features which would justify the separation of these southern forms as a geographical race. I therefore suggest the following synonymy for the two species under consideration:—

ACRAEA LYCOA, Godart.

Type: *Acraea lycoa lycoa.*

Godt., Enc. Meth. 9, p. 239 (1819); Staudinger, Exot. Schmett. 1, p. 85 (1885); Dewitz, Ent. Nachr., p. 104 (1889); Aurivillius, Rhop. Aeth., p. 115 (1898); Poulton, Trans. Ent. Soc., p. 305 (1906); Eltringham, Af. Mim. Butt., p. 47 (1910).

Sierra Leone to Nigeria. Plate I, fig. 1, ♂; fig. 2, ♀.

lycoa media, Subsp. nov.

Fernando Po to Toro.

= *lycoa*, Auriv., Ent. Tidskr., 14, p, 277 (1893).

Male distinguished by the clearer definition of the spots in the forewings, and the somewhat richer ground-colour. The female has a darker ground-colour and slightly smaller and more distinctly outlined hindwing patch.

lycoa bukoba, Subsp. nov.

Urundi Country between L. Tanganyka and L. V. Nyanza.

Male with dark ground-colour. Forewing spots medium size and ochreous. Hindwing patch ill-defined and ochreous. Female with dark ground-colour, forewing spots well defined. Hindwing patch very faintly yellow.

Plate I, fig. 3, ♂; fig. 4, ♀.

lycoa entebbia, Subsp. nov.

W. Uganda, Unyoro, Entebbe.

Male smoky grey. Forewing spots much reduced in size. Hindwing patch but little developed. Female with dark ground-colour. Forewing spots smaller and more distinct than in previous subspecies. Hindwing patch small and very faintly yellow.

Plate I, fig. 5, ♂. (Female resembles fig. 4.)

lycoa tirika, Subsp. nov.

Eastern Shore of L. V. Nyanza, Tiriki Hills.

Male resembles previous form, but forewing spots smaller and hindwing patch more distinctly developed. Female with very dark ground-colour, forewing spots small and very distinct. Hindwing patch very small and distinctly yellow.

Plate I, fig. 6, ♂.

lycoa fallax, Subsp.

Mt. Kilimanjaro.

Rogenhofer (*Planema*), Ann. d. k.k. Natur-hist. Hofmus. Wien 6, p. 459, Plate 15, fig. 6 (1891); Butler, Proc. Zool. Soc., p. 113 (1896); Auriv., Rhop. Aeth., p. 115 (1898); Poulton, Trans. Ent. Soc., p. 305, Plate 21, figs. 1*a*, 2*a* (1906); Eltr., Af. Mim. Butt., p. 47, Plate III, figs. 24, 25 (1910).

= *kilimandjara*, Oberth., Etud. d'Ent. 17, p. 26, Plate 2, fig. 17 (1893); Butler, *l. c.* (1896); Poulton, *l. c.* (1906).

Plate I, fig. 7, ♀.

lycoa kenia, Subsp. nov.

Mount Kenia, Kikuyu Escarpment.

Both sexes smaller than in other forms. Ground-colour nearly black. Hindwing patch slightly edentate between third median and radial nervules. Dark areas on underside smoky black. Male with spots and hindwing patch lemon ochreous. Female hindwing patch lemon ochreous. Forewing spots white.

Plate II, fig. 7.

lycoa aequalis, Subsp.

Abyssinia.

Roth. and Jord. Novit. Zool. XII, p. 184 (1905).

Sexes similar. Pale areas dull ochreous.

Plate I, fig. 8, ♀; fig. 9, ♂.

Acraea johnstoni.*

Type: *johnstoni johnstoni.*

Godman, Proc. Zool. Soc., p. 537 (1885); Holland, Ann.

* I have followed the usual course in maintaining the first described form as the type, though in this case the form in question

Nat. Hist., p. 248 (1893); Butler, Proc. Zool. Soc., p. 113 (1896); Aurivillius, Rhop. Aeth., p. 114 (1898); Poulton, Trans. Ent. Soc., p. 300 (1906); Eltringham, Af. Mim. Butt., p. 47 (1910).

= *Planema telekiana*, Rogenhofer, Ann. d. k.k. Naturhist., Hofmus. Wien, p. 459, Plate 15, fig. 4 (1891).
= *Acraea proteina semifulvescens*, Oberthür, Etud. d'Ent., 17, p. 26, Plate 2, fig. 21 (1893); Butler, Proc. Zool. Soc. p. 113 (1896); Poulton, Trans. Ent. Soc., p. 302; Plate 22, fig. 2*a*; Plate 21, fig. 3*a* (1906); Eltr., Af. Mim. Butt., p. 47, Plate 8, fig. 13 (1910).

Plate I, fig. 12, ♀.
Kilimanjaro, Meru, Usambara, Taveta.

johnstoni, f. *confusa*.

Rogenhof. in Baumann. "Usambara," Suppl., p. 326 (1891), and Ann. d. k.k. Natur-hist. Hofmus. Wien, p. 459, Plate 15, fig. 5 (1891).

= *johnstoni*, ♀, Butler, Proc. Zool. Soc., p. 91 (1888).
= *proteina*, Oberth., Etud. d'Ent., 17, p. 29, Plate 2, fig. 14 (1893).
= *proteina flavescens*, Oberth. *l. c.*, p. 26, Plate 1, fig. 4 (1893).
= *proteina semialbescens*, Oberth., *l. c.*, Plate 3, fig. 29 (1893).

Plate I, figs. 13, ♀; 14, ♂; 15, ♀.
Nyassaland, Usambara, Taita, Taveta, Tiriki Hills, Entebbe, Kilimanjaro, Chirinda, Kikuyu, Nguelo.

johnstoni, f. *fulvescens* (= *proteina fulvescens*).

Oberthür, *l. c.*, p. 26, Plate 2, fig. 21 (1893); Poulton, Trans. Ent. Soc., p. 304, Plate 21, fig. 4*a* (1906); Eltr., Af. Mim. Butt., p. 47, Plate 3, fig. 26 (1910).

Plate I, fig. 11, ♂.
Taita, Kilimanjaro, Nguelo.

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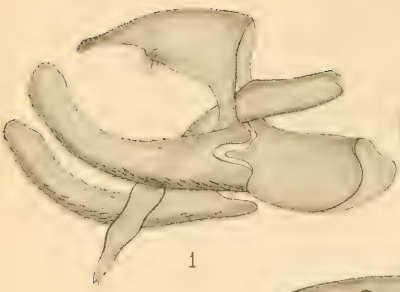
is a comparatively rare variety and there can be little doubt that *confusa* is the ancestral form, and that systematically speaking this form should be the type. In cases of this kind it would, I think, be a great advantage if there were some agreement amongst naturalists by which the commonest form of a variable species might be allowed to take the place of the type in spite of its later discovery.

H. Eltringham del

West, Newman chr.

FORMS OF A. LYCOA AND A. JOHNSTONI.



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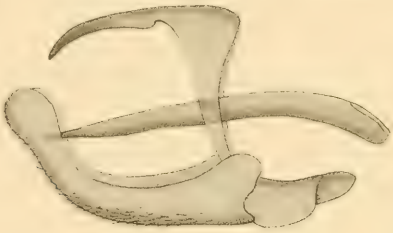

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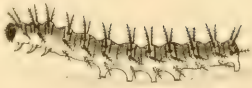

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H. Eltringham del.

West, Newman lith.

A. LYCOA AND A. JOHNSTONI.

Explanation of Plates.

Plate I.

Fig. 1. *Acraea lycoa lycoa* ♂. Oguta, Nigeria. (Tring.)
2. „ „ „ ♀. Sierra Leone. (Hope Dept.)
3. „ „ *bukoba* ♂. Urundi District. (Tring.)
4. „ „ „ ♀. „ „ „
5. „ „ *entebbia* ♂. Monyouyo, Unyora. (Tring.)
6. „ „ *tirika* ♂. Tiriki Hills. (Hope Dept.)
7. „ „ *fallax* ♀. Kilimanjaro. „ „
8. „ „ *aequalis* ♀. Banka, Malo, Abyssinia. (Tring.)
9. *Acraea lycoa aequalis* ♂. Dareta Mts., Abyssinia (Tring.)
10. *Acraea johnstoni toruna* ♀. Mt. Niragonwe. (Tring.)
11. „ „ f. *fulvescens* ♂. Nguelo, Usambara. Bred. (Tring.)
12. *Acraea johnstoni johnstoni* ♀. Nguelo, Usambara. Bred. (Tring.)
13. *Acraea johnstoni* f. *confusa* ♀. Nguelo, Usambara. Bred. (Tring.)
14. *Acraea johnstoni* f. *confusa* ♂. Nguelo, Usambara. Bred. (Tring.)
15. *Acraea johnstoni* f. *confusa* ♀. Chirinda. (Hope Dept.)

Plate II.

Fig. 1. Male Genital Armature of *Acraea lycoa*.
2. „ „ „ „ *johnstoni*.
3. „ „ „ „ „ *toruna*.
4. Neuration in *Acraea lycoa*.
5. „ „ *johnstoni*.
6. Larva of *Acraea johnstoni*.
7. *Acraea lycoa kenia* ♂. Ngondo R., Kikuyu. (Ground-colour brownish black, spots and hindwing patch lemon ochreous.)

johnstoni ab. *octobalia.*

Karsch, Ent. Nachr., 20, p. 222 (1894), Mpwapwa.

johnstoni, Subsp. *toruna.*

Grose-Smith, Pt. 57, *Acraea,* Plate 8, fig. 1 (1901); Poulton, Trans. Ent. Soc., p. 303, Plate 22, fig. 3*a* (1906); Eltr., Afr. Mim. Butt., p. 47, Plate 3, fig. 28 (1910).

= *lycoa,* ♀, var. Butler, Proc. Zool. Soc., p. 731 (1895).
= *lycoa* ab. *butleri,* Auriv. Rhop. Aeth., p. 115 (1898).

Plate I, fig. 10, ♀.

Toro, Urundi.

I have to thank Prof. Poulton for kindly allowing me to make use of the material in the Hope Department for the purpose of this investigation, and also for much kind help. I am also indebted to Mr. F. A. Heron for kindly furnishing me with sketches and other information, and to Dr. Karl Jordan for permission to examine and prepare figures from the material in the Tring Museum.

Explanation of Plates I, II.

[*See Explanation facing the* Plates.]

II. *Some undescribed Butterflies from Dutch New Guinea.*

By Sir George H. Kenrick, F.E.S.

[Read October 19th, 1910.]

Plates III–VI.

I have already described some butterflies of the genus *Delias* from New Guinea, and I now add descriptions of three more from the Arfak mountains in the north of the Island.

I also describe one species of *Ornithoptera*, which may possibly be a local form of *O. chimaera*, but as my collector did not meet with any intermediate forms between it and the type in any part of the country visited by him, I am inclined to consider it as a good species.

It appears that Mr. C. B. Pratt regarded the female of *O. tithonus* as the female of *O. chimaera* at first, not meeting with the male of *O. tithonus* for some time. When he afterwards found *O. tithonus* ♂ in company with this female, he began to suspect his error, and he subsequently found the true female of *O. chimaera*.

I have accordingly figured both sexes of both insects.

Writing of *O. tithonus* he says, "The day after we arrived, we each took one specimen of the male—one fortunately being perfect. Soon after we noticed a tree overhanging a steep precipice, with a sheer drop of 500 ft. to the river below.

"Flying round and round this tree were many males and females, more of the former than the latter. We offered the natives very good payment if they would go up with a net, but the tree was of a soft kind of wood, and being in such a dangerous position we could not persuade them to do so. We ourselves guarded the ridge every day, but the males never once left the tree, so after some time we had the tree cut down, thinking that then the males would disperse and seek other flowering trees, but after the tree had fallen we never saw another male."

The first specimen of *O. rothschildi*, a male, was brought to Mr. Pratt by a native, who said that he had taken it on

Mount Koberai, at an elevation of about 8000 ft., but others were subsequently taken at 6000 ft., or even lower.

Ornithoptera rothschildi, n. sp.

(Plate V, ♂, VI, ♀.)

Male: Of the general type of *O. priamus*, but fore-wing narrower and hind-wing more oval. Upper-side: fore-wing black, with scattered green scales distributed in long ill-defined patches. Three of these are above the subcostal nervure between the end of the cell and the apex. Three are below the cell and between nervures 1 and 2, 2 and 3, and 3 and 4, but they do not reach the termen. There is also a narrow band along the inner margin. Hind-wing black; the disc covered by a large patch of gold, terminating in a series of points between the nervures, which are black. Across this patch of gold extends a tapering green band in which are 5 ill-defined black spots. Fold black. The under-side in both wings similar to the upper-side, but the green is more golden and better defined in patches and spots in the fore-wing. Exp. 154 m-m.

Female: Resembles the same sex in *O. priamus*, *paradisea*, and *tithonus*, but may be distinguished from all three by the following characters—

1. The abdomen, which is hairy all over and heavily ringed with black, especially above.
2. The absence of white markings in the cell of the fore-wing.
3. The presence of 7 black spots on the hind-wing instead of 6 as in *tithonus*, the seventh being nearer the costa.
4. The under-side of the hind-wing being much less white than in any of the others. In the hind-wing the black patch at the base entirely covers the cell itself, but on either side it does not extend much beyond the middle of the cell. Exp. 190 mm.

Dr. K. Jordan, who has kindly compared these insects with the specimens of *O. chimaera* at Tring, writes as follows—

"The chief differences in the male are as follows: in *O. rothschildi* the green colour at apex of fore-wing is reduced, as is also the case with the cell streak; hind angle of fore-wing more rounded off, the whole being narrower, less triangular; the black interspace between central green area and green hind-marginal streak smaller on hind-wing, which is less elongated; black margins very much broader, the black spots much nearer the cell, hardly any green at outer edge of golden area; the green area which

extends from black abdominal margin across apex of the cell, and encloses the black spots, is not present in *chimaera*.

"On under-side there is only a small green streak in cell of fore-wing, and there is hardly any green beyond apex of cell between the subcostals; the hind-wing is also very different from that of *chimaera*.

"*Female:* The fore-wing, as in male, more ovate than in *O. chimaera*, owing to the obliquely rounded-off hind-angle; cell without spot, whereas the three discal spots placed below cell are at least as large as in *chimaera*; black border to hind-wing broader than in *chimaera*, also differently shaped, the two posterior sections of the yellowish-grey area extended nearer to the cell than even in those *chimaera* which have a spot in the apex of the cell, no such spot in *O. rothschildi*."

Delias africanus, n. sp.

(Plate III, fig. 2.)

Head, legs, and antennae black, palpi with grey hairs. Thorax with yellow hairs below, and the usual white hairs above, which extend to the base of the abdomen and below the cell of the hind-wing. Abdomen yellowish white.

Upper-side: fore-wing sooty black, a little darker on the margins; hind-wing the same, but with an ill-defined yellowish patch extending partly over the cell.

Under-side: fore-wing sooty black, with a band of 5 irregular yellow apical spots: between the cell and the inner margin the spaces between the nervures are partly covered with white scales. Hind-wing velvety black, a curved band of sulphur yellow near the base; the greater portion of the disc is filled with an elliptical patch of pale pink suffused with orange: beyond the cell is a singular black patch resembling a negro's head and neck. Exp. 60 mm.

Arfak Mountains, January 1909.

Near to *D. d'Albertisi*, Oberthür, but differs in the shape and position of the black patch on the under-side of the hind-wing.

Delias imitator, n. sp.

(Plate III, fig. 3.)

Head, palpi, antennae, and legs black. Thorax black with a few white hairs above. Abdomen dark grey above, white beneath.

Upper-side: fore-wing rather pointed, and outer margin slightly

waved; ground-colour black; an oblique yellowish band extends from the middle of the inner margin towards the apex, it is interrupted at the cell, and a white apical dot continues the line; there are four white dots on the hind margin. Hind-wing yellowish white, with a broad black border extending from costa half way round the wing and then continuing as a very narrow margin; in the broad part are three white dots.

Under-side: fore-wing as above, but the oblique band is wider and the spots are more distinct; hind-wing black, with narrow white costal stripe and broad angulated transverse white band, outwardly serrated. In the black margin beyond are 6 irregular pale spots; there are also 3 yellow spots in the dark basal portion, and a thin white line following nervure 1*b*. Female very similar, but the wings are more rounded. Exp. 50 mm.

Arfak Mountains, January 1909.

This insect bears a singular resemblance to some of the species of the South American genus *Leodonta*, in which the neuration is almost the same.

Delias elongatus, n. sp.

(Plate III, fig. 4.)

Head, palpi, antennae, and legs black. Thorax black, with brown hairs below. Abdomen dark grey above, white beneath.

Upper-side: fore-wing dull black, faintly darker at end of cell; an apical and marginal row of 7 ill-defined subtriangular white spots. Hind-wing white, with black border of medium width. The base of the wing fades into dark grey, and there is an ill-defined black spot at end of cell.

Under-side: fore-wing dark grey with a whitish triangular patch from inner margin upwards; the marginal spots are well-defined and quadrate. Hind-wing white; a well-defined tapering black streak extends along the costa, followed by a white band: then follows a V-shaped black mark with apex towards the body and extending from costa nearly to the angle. There is a round black spot at the end of the cell, and a rusty ill-defined cloud covering half the basal area. Marginal band deep black. Exp. 52 mm.

Arfak Mountains, January 1909. A single male specimen only.

This insect differs from most of the New Guinea species of *Delias* in having the wings longer and narrower, and resembles some of the Australian species in this respect.

The marking of the under-side of the hind-wing is quite remarkable and unusual in the genus.

Libythea hatami, n. sp.

(Plate IV, fig. 2.)

♀. Head dark brown; palpi, thorax, and abdomen on the upper-side dark brown, on the under-side covered with grey hairs, the legs wholly grey.

Upper-side: fore-wing of the usual shape in the genus, dark brown inclined to sooty, an oval white spot at end of cell; another spot, quadrate in form beyond this and between nervures 3 and 4, extending partly between 4 and 5; two rounded white spots nearer the apex separated by nervure 6; between these and the end of the cell is an irregular spot tapering to the costa and crossed by two dark nervures. Hind-wing slightly emarginate, dark brown; a transverse white band occupies the disc, but does not reach either margin; a quadrate white spot extends from the middle of the costa to the subcostal nervure; fringes of both wings whitish.

Under-side: the ground-colour is much paler; all the spots are repeated on a larger scale, and in addition the surface is marbled with a number of whitish scales. Exp. 44 mm.

Mountains of Hatam, 3000 ft.

Explanation of Plates III–VI.

Plate III.

Fig. 1. *Ornithoptera tithonus* ♂. p. 16.
„ 2. *Delias africanus*, n. sp. p. 18.
„ 3. *D. imitator*, n. sp. p. 18.
„ 4. *D. elongatus*, n. sp. p. 19.

Plate IV.

Fig. 1. *Ornithoptera tithonus* ♀. p. 16.
„ 2. *Libythea hatami*, n. sp. p. 20.

Plate V.

Ornithoptera rothschildi, n. sp. ♂. p. 17.

Plate VI.

Ornithoptera rothschildi, n. sp. ♀. p. 17.

Horace Knight del. et lith.

West, Newman chr.

NEW AND RARE BUTTERFLIES FROM DUTCH NEW GUINEA.

2

1

Horace Knight del. et lith.

West, Newman chr.

NEW AND RARE BUTTERFLIES FROM DUTCH NEW GUINEA

Horace Knight del. et lith.

West, Newman chromo.

ORNITHOPTERA ROTHSCHILDI, ♂.

Horace Knight del.et lith.

West,Newman chromo.

ORNITHOPTERA ROTHSCHILDI, ♀.

III. *A Revision of the Genus* Diplatys, *Serv.* (Dermaptera)

By Malcolm Burr, D.Sc., F.L.S., F.Z.S., F.E.S.

[Read April 6th, 1910.]

Plates VII, VIII.

In working out the Dermaptera for the "Fauna of British India" series, I was surprised at the number of undescribed species of *Diplatys* which came to hand.

Six species, including African and American, were included by de Bormans in his monograph of the Dermaptera in 1900, yet in India alone we have now double that number, of which ten were described by myself, seven of them in the Indian monograph.

A considerable number from other parts of the world rendered necessary a thorough revision of the genus. The synonymy has now been to a great extent cleared up, and there are no less than 33 species already known to science, including those first described in these pages.

In 1904[2] I tentatively proposed a first attempt at a classification based on structural characters, and I have found this quite serviceable when elaborated to receive the recently discovered species.

It is quite certain that there remain a very great many new forms yet to be discovered, and very probably the number of described species will be doubled within the next few years.

Exceedingly valuable characters are afforded by the subanal plate, or penultimate ventral segment.

This may be entire, emarginate, or more or less lobed. The latter is the rarer shape: there is a small rectangular lobe in *D. angustatus*, and in *D. nigriceps* there is a small obtuse convexity.

In *D. conradti* and *D. bormansi* there is a small round emargination, but the outline is more complex in *D. gerstaeckeri*, *D. ernesti*, *D. flavicollis*, and *D. siva*; in the latter there are two round emarginations, with a smaller obtuse emargination between them, so that there projects a transverse, sinuate lobe between the two deep incisions. In

D. gerstaeckeri there are two emarginations leaving an acute triangle between them; in *D. ernesti* the general form is the same, but the triangular lobe is more obtuse. In *D. flavicollis* there is a sharp incision forming two acute lobes.

Where the subanal plate is entire, the posterior margin may be gently sinuate or straight, the sides convex or parallel, or the whole plate more or less rectangular or rounded.

In *D. macrocephalus* it is very broad, subquadrate, the posterior margin subsinuate, the exterior angles rounded. In *D. gladiator* the outline is similar, and in *D. falcatus* and *D. lefroyi*; in all these the sides are convex, the posterior margin being almost straight in the former, and narrower and subsinuate in the latter.

In the group with non-emarginate subanal plate, we find *D. bicolor*, *D. vosseleri*, *D. griffithsi*, and *D. greeni* with the posterior margin gently sinuate; the remaining species, with non-sinuate, entire subanal plate, fall into two groups; the first has the last dorsal segment non-inflated: in this group we have *D. jacobsoni* and *D. annandalei*, both Oriental species, with the subanal plate rectangular; it is more or less rounded at the sides and angles in *D. rufescens*, *D. fletcheri*, and *D. fella*.

The last dorsal segment is inflated in *D. liberatus*, *D. raffrayi*, and *D. aethiops*.

In the genus *Diplatys*, we find that a grouping of the species according to the form of the last sclerites and of the forceps gives results agreeing fairly well with the geographical distribution of the species. At the same time, the outline of the pronotum affords useful features, as also the structure of the head.

We find three distinct types of head. In one type the three areas with which the dorsal aspect is divided by the transverse and median sutures are not strongly differentiated from each other; the frons is not specially tumid, and the right and left portions of the occiput are not specially depressed, nor are they furnished with postocular keels running from the inner margin of the eyes to the extero-posterior angles of the head; the sutures are well marked. This may be called the normal type of head, as it shows the minimum deviation from the general type of Dermapterous head. We find this normal type of head in *D. gladiator* and *D. bicolor*.

In the next type, which we may call the sloping type, the frons is distinctly tumid, the tumidity gradually dying out posteriorly, ending at the posterior margin of the head itself; the occiput is not strongly nor abruptly depressed, nor markedly separated from the frons, the transverse suture being obsolete, and the median suture nearly so. In this type there are more or less sharp keels running from the interior margin of the eye to the extero-posterior angles of the head: these keels are gently arched in *D. lefroyi*; in *D. aethiops*, *D. jansoni*, and *D. severa* they are strong, and the posterior margin is incrassate, so that they fuse with it, thus forming a blunt rectangular ridge at the posterior angle, this ridge continuing to the median suture, which is short and distinct; in *D. jacobsoni* the keels are sharp and distinct, but short, whereas in *D. gerstaeckeri* and *D. ernesti* they are longer.

In the third type of head the frons is markedly tumid and the occiput strongly depressed; the transverse suture is sometimes strongly marked, but sometimes indistinct or obsolete, the tumid frons passing abruptly into the depressed occiput with no clear suture, but only brusque change from tumidity to depression. The members of this group, which have rather short and feeble keels, are *D. siva*, *D. annandalei*, *D. conradti*, *D. angustatus*, and *D. griffithsi*; those with strong, sharp, and long keels, are *D. macrocephala*, *D. bormansi*, *D. greeni*, *D. rufescens*, *D. vorseleri*, *D. raffrayi*, *D. gracilis*, and *D. fletcheri*. The sutures are especially distinct in *D. vosseleri*.

There appears, however, to be no connection between the structure of the head and geographical distribution, since we find in each group this arranged species from various zoogeographical regions.

In order, therefore, to approach a more natural system, it is necessary to adopt the structure of the apex of the abdomen and its appendages as our basis of classification, having recourse to the structure of the head and form of the pronotum for supplementary features.

The pronotum is long and narrow in *D. thoracicus*, but as a rule the length is but little greater than the breadth: the usual outline ranges between subpentagonal, subrectangular, and suboval.

In some species the abdomen is strongly and abruptly dilated at the apex, the last segment being strongly inflated; in others, the abdomen is less strongly and more

gradually dilated, in which case the last segment is feebly inflated; in others, the dilation is scarcely pronounced, the last dorsal segment being not inflated at all. The branches of the forceps may be remote at the base and arcuate, or subcontiguous and nearly straight; they may be depressed or trigonal. In some cases they are strongly dilated at the base itself, as well as flattened, thus reminiscent of the Forficuline type of forceps.

All these above-mentioned characters are peculiar to the males; in the females, the structure of the head is simple and not specialised, the apex of the abdomen not dilated, and the forceps invariably contiguous and simple.

The number of described species has been so much augmented in recent years, that what were formerly considered to be dimorphic forms of the male are probably to be considered distinct species. It is obvious that the characters given by de Bormans are quite valueless, for the species were discriminated by him by colour alone.

The form of the penultimate ventral segment is very difficult to describe in words, and often hard to distinguish with the eye. The figures illustrate these diverse forms better than any words can do.

TABLE OF SPECIES.

1. Forcipis bracchia ♂ basi valde dilatata ac deplanata.
   2. Segmentum ultimum dorsale ♂ fortiter dilatatum, abdomine valde latius; forceps abrupte attenuatus.
      3. Elytra vix longiora quam latiora; alae abortivae; species indica . . 1. *gladiator*, Burr
      3.3. Elytra valde longiora quam latiora; alae perfecte explicatae.
         4. Segmentum penultimum ventrale ♂ subquadratum, postice haud angustatum, medio haud impresso; species africana . 2. *macrocephalus*, Beauv.
         4.4. Segmentum penultimum ventrale ♂ postico subangustatum, medio impresso; species indica . . . . . 3. *falcatus*, Burr

2.2. Segmentum ultimum dorsale ♂ paullo dilatatum, abdomine vix latius; forcipis pars dilatata brevis, a supero aegre distinguenda; species indicae.

3. Segmentum penultimum ventrale ♂ lateribus rotundatis, margine postico leviter sinuato; forcipis bracchia ♂ robusta, leviter arcuata . . . . . 4. *lefroyi*, Burr

3.3. Segmentum penultimum ventrale ♂ fortiter angustatum, margine postico in lobum truncatum producto; forcipis bracchia graciliora, fortius arcuata . . . . . 5. *angustatus*, Burr

1.1. Forcipis bracchia ♂ basi haud valde dilatata.

2. Pronotum duplo longius quam latius, parallelum; species brasiliensis. (Pronotum femoraque pallida, nigro-vittata) . . . . 6. *thoracicus*, Dohrn

2.2. Pronotum haud plus quam $1\frac{1}{2}$ longius quam latius, vel aeque longum ac latum.

3. Antennae segmentis 4 globulari, 5 pyriformi (segmentum penultimum ventrale angustum; parallelum, apice rotundatum; pronotum longius quam latius; colore fulvo-rufo, species brasiliensis) . . . . . 7. *gracilis*, Stål

3.3. Antennae segmentis omnibus cylindricis vel subcylindricis.

4. Occiput ♂ margine postico ipso incrassato, plus minus reflexo; (pronotum aeque longum ac latum; species neotropicae).

5. Segmentum ultimum dorsale abdomine vix latius; colore rufo, nigro-variegato . . . 8. *jansoni*, Borm.

5.5. Segmentum ultimum dorsale ♂ abdomine dimidio latius; colore atro . . . 9. *severa*, Borm.

4.4. Occiput ♂ margine postico haud incrassato; species africanae et orientales.

5. Segmentum penultimum ventrale ♂ vel emarginatum, vel lobatum.

6. Segmentum penultimum ventrale ♂ simpliciter rotundato-emarginatum . 10. *conradti*, Burr

6.6. Segmentum penultimum ventrale ♂ emarginatum ac lobatum.

7. Segmentum penultimum ventrale ♂ emarginatione transversa, lobulis brevibus.

8. Segmentum penultimum ventrale ♂ lobulis brevissimis, acutis . . . . . 11. *bormansi*, Burr

8.8. Segmentum penultimum ventrale ♂ lobulis majoribus rotundatis . . . 12. *dohrni*, sp. n.

7.7. Segmentum penultimum ventrale ♂ medio lobo instructum, utrinque emarginatum.

8. Segmentum penultimum ventrale ♂ lobo ipso sinuato vel emarginato.

9. Segmentum penultimum ventrale ♂ lobo transverso, margine sinuato, utrinque rotundato-emarginatum. 13. *siva*, Burr

9.9. Segmentum penultimum ventrale ♂ lobo angustiori medio profunde fisso . . 14. *flavicollis*, Shir.

8.8. Segmentum penultimum ventrale ♂ lobulo integro.

9. Segmentum penultimum ♂ lobulo acuto; colore rufo-testaceo . . . . 15. *gerstaeckeri*, Dohrn

9.9. Segmentum penultimum ventrale ♂ lobulo rotundato; colore fusco vel nigro . . . 16. *ernesti*, Burr

5.5. Segmentum penultimum ventrale ♂ neque emarginatum nec lobatum.

6. Segmentum penultimum ventrale ♂ margine postico convexo . . . 17. *nigriceps*, Kirby

6.6. Segmentum penultimum ventrale ♂ margine postico sinuato vel truncato.

7. Segmentum penultimum ventrale ♂ margine postico leviter sinuato.

8. Forcipis bracchia ♂ depressa, recta, vix attenuata.

9. Pronotum rotundatum; colore fulvo; species africana . . . 18. *bicolor*, Dubr.

9.9. Species borneensis. 19. *griffithsi*, sp. n.

8.8. Forcipis bracchia ♂ basi incrassata, tum attenuata, subarcuata; (colore fusco; species ceylonica) . . . 20. *greeni*, Burr

7.7. Segmentum penultimum ventrale ♂ margine postico truncato vel rotundato.

8. Segmentum ultimum dorsale ♂ vix inflatum, abdomine vix vel paullo latius.
9. Segmentum penultimum ventrale ♂ apice rotundatum vel angustatum, vel saltem lateribus subrotundis.
10. Segmentum penultimum ventrale ♂ angulis haud rotundatis (colore fulvo; species indica) . . . . 21. *rufescens*, Kirby

10.10. Segmentum penultimum ventrale ♂ angulis rotundatis.
11. Segmentum penultimum ventrale ♂ lateribus subconvexis, apice subangustatum, ac truncatum.
12. Statura majore; forcipis bracchia elongata; species africana . . . 22. *vosseleri*, Burr

12.12. Statura minore; forcipis bracchia brevia; species ceylonica . . . 23. *fletcheri*, Burr

11.11. Segmentum penultimum ventrale ♂ lateribus subconcavis, apice fortius angustatum; species africana . . . . . 24. *fella*, sp. n.

9.9. Segmentum penultimum ventrale ♂ rectangulare; species orientales.
10. Segmentum ultimum dorsale ♂ abdomine vix latius; forcipis bracchia ♂ haud contigua, depressa, interdum falcata; colore fulvo . . . 25. *jacobsoni*, sp. n.

10.10. Segmentum ultimum dorsale ♂ abdomine distincte latius, sed haud inflatum; forcipis bracchia ♂ contigua; colore fusco . . . . 26. *annandalei*, sp. n.

8.8. Segmentum ultimum dorsale ♂ inflatum, abdomine valde latius.

9. Abdomen apicem versus sensim ampliatum, segmento ultimo ceteris valde latiori; species orientalis . . . . . 27. *liberatus*, Burr

9.9. Segmentum ultimum dorsale ♂ fortiter et abrupte inflatum; species africanae.

10. Statura majore; pubescens; occiput impressum; colore fusco, rufo variegato . . 28. *raffrayi*, Borm.

10.10. Statura minore; glabra; occiput repletum; colore atro . . . . . 29. *aethiops*, Burr

1. *Diplatys gladiator*, Burr

Diplatys gladiator, Burr, (1905[4]) pp. 28 and 29, (1906[1]) p. 319, (1910[1]) p. 41.

This is a very distinct species ; it is one of the few with the normal type of head, with abortive wings and rather short elytra ; the coloration and forceps are also distinctive. It is described and discussed in (1910[1]). It is recorded from Calcutta.

Type in the Indian Museum, Calcutta.

2. *Diplatys macrocephalus*, Pal.-Beauv.

Forficula macrocephala, Pal.-Beauv., (1805) p. 36, orth. Pl. I, fig. 3.

Diplatys macrocephala, Serv., (1831) p. 33, (1839) p. 51.

„ „ Scudd., (1876) p. 309.

„ „ Borm., (1900[2]) p. 9, fig. 5 (excl. syn.), (nec Borm. 1888 and 1894).

Diplatys macrocephala, Burr, (1900[3]) p. 47, (1904[2]) p. 282.

Diplatys macrocephala, Kirby, (1904) p. 1 (excl. syn. *D. raffrayi*).

Diplatys macrocephala, Borelli, (1907[5]) p. 346.

This species, the type of the genus, resembles some of the Indian species with inflated last dorsal segment. It occurs in West Africa, in the Congo State at Boma (Mus. Brux.) and Stanley Pool (c.m.), in Benin under the bark of trees (Pal.-Beauv.), and in Fernando Po, at Basile, at an elevation of 2000 ft. (Borelli). The species from Burma recorded under this name by de Bormans are to be referred to *D. bormansi* and *D. liberatus*.

I was unable to find the type in the Paris Museum, and do not know where it is.

3. *Diplatys falcatus*, Burr

Diplatys falcatus, Burr, (1910[1]) p. 42, fig. 4 and fig. 3*a* in text.

This Indo-Burmese species is described, discussed and figured by me in (1910[1]). It has a superficial resemblance to the preceding species, but the penultimate ventral segment is different.

Type in the Indian Museum, Calcutta.

4. *Diplatys lefroyi*, Burr

Diplatys lefroyi, Burr, (1910[1]) p. 44, fig. 5 and fig. 3*b* in text.

This is another Indian species described and figured in the same work. The basal dilation of the forceps is so short that it may easily escape detection. Thus the species has a superficial resemblance to *D. bormansi*, but it is in reality allied to *D. falcatus*.

Type in the Indian Museum, Calcutta.

5. *Diplatys angustatus*, Burr

Diplatys angustatus, Burr, (1910[1]) p. 44, fig. 6 and fig. 3*c* in text.

This Indian species is related to the preceding, but may be at once distinguished by the rectangular lobe on the penultimate ventral segment.

Type in the Indian Museum, Calcutta.

6. *Diplatys thoracicus,* Dohrn

Cylindrogaster thoracicus, Dohrn, (1863) p. 59.
„ „ Borm., (1900²) p. 12.
„ „ Kirby, (1904) p. 2.

This Brazilian species may be recognised at once among all its congeners, by the long and narrow pronotum, which is nearly twice as long as broad, with parallel sides. The head is humid, with depressed occiput and sharp postocular keels.

It is apparently a rare species. Dohrn records it from Rio de Janeiro, and there is a broken male from Espirito Santo in the Brunner collection in Vienna.

Dohrn states that the type is in the Helsingfors Museum.

7. *Diplatys gracilis,* Stål

Cylindrogaster gracilis, Stål, (1855) p. 350.
„ „ Dohrn, (1863) p. 58.
„ „ Borm., (1900²) p. 11, fig. 8.
„ „ Kirby, (1904) p. 2.
„ „ Burr, (1909²) p. 254.
Diplatys gracilis, Stål, (1860) p. 306.
Cylindrogaster sahlbergi, Dohrn, (1863) p. 59.
„ „ Borm., (1900²) p. 12.

This is a second Brazilian species, resembling the former, but with shorter pronotum, and dull red colour. I sink as synonymous *D. sahlbergi,* Dohrn, which differs only in trifling variation of colour: de Bormans (l.c.) suggested their specific identity. The globular fourth, and pyriform fifth, antennal segments are distinctive.

It is recorded from Rio de Janeiro, Theresopolis, and Espirito Santo.

8. *Diplatys jansoni,* Kirby

Cylindrogaster jansoni, Kirby, (1891) p. 507.
Diplatys jansoni, Borm., (1893) p. 2, Pl. I, fig. 102, (1900²) p. 9.
Diplatys jansoni, Kirby, (1904) p. 2.
„ „ Burr, (1904²) p. 278, 280.

It is a handsome red and black species occurring in Central America. It is closely allied to the following.

The head in both these species has the same structure as in the Ethiopian *D. aethiops,* that is, smooth and humid,

with thickened posterior margin joining the postocular keels.

The contrast between the deep black and bright orange red is very striking; the females especially have a strong superficial resemblance to red and black *Staphylinidae.*

Type in the B.M.

9. *Diplatys severus,* Borm.

Diplatys severa, Borm., (1893) p. 2, Pl. I, fig. 3, (1900[2]) p. 9.

Diplatys severa, Kirby, (1904) p. 2.

„ „ Burr, (1904[2]) p. 278 and 280.

An all-black ally of the preceding, occurring also in Central America. De Bormans suggested that it may be merely a melanic form of *D. jansoni,* but the last abdominal segment is more strongly dilated and the body is much more hairy.

Type in the B.M.

10. *Diplatys conradti,* Burr

Diplatys conradti, Burr, (1904[2]) p. 278 and 281, (1907[9]) p. 508.

Diplatys conradti, Borelli, (1907[5]) p. 346.

This is an African species allied to *D. raffrayi,* but slenderer, the postocular carina shorter and blunter; the penultimate ventral segment of the male has a round median emargination, as in the structurally related Burmese *D. bormansi,* but the pronotum is longer.

Type in the Paris Museum.

11. *Diplatys bormansi,* Burr

Diplatys macrocephala, Borm. (nec Pal.-Beauv.), (1888) p. 433, (1894) p. 372, (1900[2]) p. 9 (text, partim).

Diplatys nigriceps, Burr, (1904[2]) p. 279 and 284 (partim).

Diplatys bormansi, Kirby, (1904) p. 1 (nomen nudum).

„ „ Burr, (1910[1]) p. 45, figs. 91, 91*a*.

This is a Burmese species which was confused by de Bormans with *D. macrocephalus,* and by me with *D. nigriceps* and *D. greeni.* It differs from them all in having the penultimate ventral segment of the male emarginate in the middle.

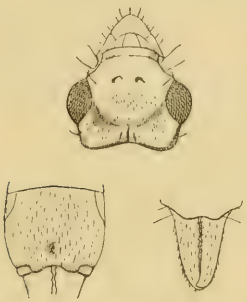
The superficial resemblance to *D. nigriceps, D. greeni,* and *D. liberatus* is very strong.

Type in my collection.

12. *Diplatys dohrni,* sp. n.

Parva, nigra; caput laeve, tumidum; segmentum ultimum sat inflatum; segmentum penultimum ventrale parallelum, margine postico utrinque profunde exiso, lobo medio sinuato; forcipis bracchia contigua, conica. ♂.

	♂
Long. corporis	7·5 mm.
,, forcipis	1 ,,



D. dohrni.

Small and slender; general colour black.

Antennae brownish, second and third segments yellowish (ten segments remain).

Head tumid, smooth, sutures obsolete; postocular region tumid, not keeled.

Pronotum bordered posteriorly with whitish; about as broad as long, and somewhat narrowed posteriorly.

Elytra very ample, pubescent, black.

Wings ample, and long, of the same colour.

Legs blackish, the joints yellowish.

Abdomen black, with golden pubescence; slender, widening gradually from the waist to the

Last dorsal segment, which is large, considerably, but not abruptly, inflated.

Penultimate ventral segment ample; posterior border with a deep round emargination on each side, near the corner, thus forming a medium transverse lobe which is gently sinuate, with rounded angles.

Forceps with the branches short, contiguous, and straight.

JAVA: (Fruhstorfer).

This species is founded on a single male kindly communicated to me by Dr. H. Dohrn, in whose collection it is. It belongs to the group of *D. bormansi* with round

emarginations on the penultimate ventral segment, but the emarginations are far deeper and stronger than in that species, and more rounded, with a consequently more prominent median lobe, which has the angles more rounded. The form resembles that of *D. siva*, but this is a much smaller and weaker insect.

13. *Diplatys siva*, Burr

Diplatys siva, Burr, (1904[2]) p. 278 and 283, (1906[3]) p. 387, (1907[9]) p. 508, (1910[1]) p. 49.

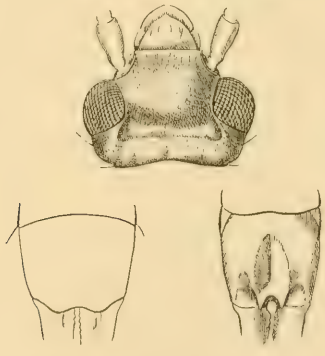
This is a large, dull grey-brown North Indian species, well characterised by the peculiar form of the penultimate ventral segment of the male.

Type in the Paris Museum.

14. *Diplatys flavicollis*, Shiraki

Diplatys flavicollis, Shir., (1907) p. 104.
„ „ Burr, (1909[7]) p. 339 and 340.

This species is described by Shiraki from Formosa on the model of the old-fashioned descriptions of de Bormans,



D. flavicollis.

with practically no reference to structure; so from his work alone it is impossible to determine its true position with accuracy.

Fortunately, I possess a male from Taiwan, Formosa, which agrees in every respect with Shiraki's description, and I have no hesitation in identifying it as *D. flavicollis*.

The chief feature is the very characteristic form of the penultimate ventral segment, in the middle of the posterior

margin of which there is a deep and narrow incision, forming a pair of rather long, acute lobes.

The head is of the third type, that is, the frons is strongly tumid, with well-marked transverse depression behind; the edge of the occiput is somewhat swollen, the sutures not very distinct.

The pronotum is subpentagonal, a trifle longer than broad, and somewhat narrowed posteriorly. The last dorsal segment is inflated, but not very strongly, and the forceps are simple, contiguous, somewhat depressed, and straight, feebly hooked at the tips.

15. *Diplatys gerstaeckeri*, Dohrn

Nannopygia gerstaeckeri, Dohrn, (1863) p. 60.
„ „ Scudder, (1876[4]) p. 326.
„ „ Borm., (1884) p. 372, (1900[2]) p. 11.
Dyscritina longisetosa, Westwood, (1881) p. 601, Pl. XXII, fig. 1.1-a-1.
Dyscritina longisetosa, Green, (1896) p. 229, (1898) p. 383.
Diplatys longisetosa, Burr, (1898[1]) p. 388, Pl. XVIII, fig. 4, 5 and 16, Pl. XIX, fig. 9 and 4.
Diplatys longisetosa, Borm., (1900[2]) p. 10, fig. 6.
Diplatys gerstaeckeri, Burr, (1901) p. 74, Pl. A, fig. 4 and 5, (1904[2]) p. 299 and 282, (1910[1]) p. 46, fig. 7 and 3*d* in text.
Cylindrogaster rufescens, Burr (nec Kirby), (1900[3]) p. 48.

This little red Singalese species is fully described, figured and discussed by me in (1910[1]). It forms a natural group with *D. ernesti*, Burr, characterised by the emargination of the penultimate ventral segment of the male.

It is this species whose postembryonic development has been described by Green under the name *Dyscritina longisetosa*.

Type in the Berlin Museum.

15a. *Diplatys gerstaeckeri*, var. *calidasa*, Burr

Diplatys gerstaeckeri, var. *calidasa*, Burr, (1904[2]) p. 279 and 282, (1906[3]) p. 387, (1907[3]) p. 508, (1910[1]) p. 48.

This is a large North Indian form, of which the female only is known; it resembles *D. gerstaeckeri* in every respect except size, but discovery of the male may show

that it is a distinct species. Perhaps it is the female of *D. rufescens.*

Type in the Paris Museum.

16. *Diplatys ernesti,* Burr

Diplatys ernesti, Burr, (1910[1]) p. 48, fig. 9.

A small black Singalese species closely allied to *D. gerstaeckeri.* It differs in the all-black colour and in the more obtuse and broader median triangular lobe on the posterior margin of the penultimate ventral segment of the male.

Type in my collection.

17. *Diplatys nigriceps,* Kirby

Diplatys nigriceps, Kirby, (1891) p. 507, (1904) p. 2.
„ „ Borm., (1900[2]) p. 10 (partim).
„ „ Burr, (1902) p. 477, (1904[2]) p. 279 and 284 (partim).
Diplatys croixi, Burr, (1904[2]) p. 280 and 284, (1907[9]) p. 508.

This black and white species is characterised by the form of the penultimate ventral segment of the male, which is gently rounded at the sides, with the posterior margin slightly, but distinctly, convex in the middle; there is also a median depressed sulcus.

It was originally described from Hong Kong, but probably *D. croixi,* Burr, in the Paris museum, from Malacca Peninsula, and the Borneo specimen in the Budapest Museum, are to be referred here.

It is unknown in Burma, Ceylon, and India, though specimens of *D. greeni,* Burr, from Ceylon, were confused with it; and probably, also, of *D. bormansi,* Burr, and *D. liberatus,* Burr, from Burma.

Therefore, several mentions of *D. nigriceps* in literature really refer to one of those species, the synonymy of which should be examined.

Type in the B.M.

18. *Diplatys bicolor,* Dubr.

Labia bicolor, Dubrony, (1879) p. 95.
„ „ Borm., (1900[2]) p. 72.
„ „ Kirby, (1904) p. 25.

This species, of uniform tawny colour, and head of the normal type, is known from Abyssinia and Eritrea.

Type in Madrid Museum.

19. *Diplatys griffithsi,* sp. n.

Statura minore; colore fulvo et castaneo; pronotum breve; subrotundatum; segmentum ultimum dorsale ♂ haud inflatum; segmentum penultimum ventrale ♂ parallelum, margine postico late sinuato, angulis subrotundatis; forcipis bracchia ♂ depressa, recta, intus crenulata, apice recurva.

	♂	♀
Long. corporis	7·5 mm.	9·5 mm.
,, forcipis	1·25 mm.	1.25 mm.

Size small; general colour dark chestnut, varied with tawny. Antennae with 15–17 segments, all cylindrical, 4th a little shorter than the 3rd, basal two blackish, the rest yellowish, passing to greyish towards the apex.

Head broad and flat, dark chestnut, frons tumid, occiput depressed with distinct keel behind the eyes, which are very large and prominent; the frons is less tumid and occiput less depressed in the ♀.

Pronotum tawny, about as broad as long, anterior, margin convex sides converging posteriorly as the posterior margin is strongly narrowed; prozona distinctly tumid and metazona depressed.

Scutellum prominent, depressed.

Elytra ample, dark chestnut, tawny at the shoulders.

Wings ample, dark chestnut; legs pale yellowish, sometimes shaded with brown.

Abdomen parallel in ♀, gently constricted in the middle in the ♂, smooth, yellowish at the base, passing to dark chestnut towards the apex; lateral tubercles of 3rd and 4th segments distinct.

Last dorsal segment in the ♂ not inflated, no wider than the abdomen, rectangular in the ♂, slightly narrowed in the ♀.

Penultimate ventral segment in the ♂ parallel-sided, posterior margin broad, sinuate, the angle slightly produced, thus forming small, rounded lobes; in the ♀ narrow, rounded.

Forceps with the branches in the ♂ depressed, subcontiguous, straight, inner margin serrulate, points hooked; in ♀ subcontiguous, straight, trigonal.

Borneo: *Sarawak,* Saribas, August 1908 (Museum Sarawak); British North Borneo, Sambas, March 1st, 1909 (*C. Griffiths,* c.m.).

This species falls with the group of *D. greeni,* characterised by the sinuous posterior margin of the penultimate

ventral segment of the male ; from *D. greeni* it differs in the depressed forceps; from the Ethiopian, *D. bicolor*, Dubr., and *D. vosseleri*, Burr, in the parallel-sided penultimate ventral segment of the ♂ and broad sinuation. It is different in colour from *D. bicolor*, and much smaller than *D. vosseleri*. It is dedicated to my friend Mr. Cyril Griffiths, A.R.S.M., who discovered the female at Sambas.

Type in my collection.

20. *Diplatys vosseleri*, Burr

Diplatys vosseleri, Burr, (1907[10]) p. 201, (1909[2]) p. 253.

This is a large brown East African species; the head is of the third, or typical, form, with all the sutures very well marked.

Type in the Berlin Museum.

21. *Diplatys greeni*, Burr

Dyscritina longisetosa, Green, (1896) p. 229, figs. partim.

Dyscritina, sp. n., Green, (1898) p. 383.

Diplatys nigriceps, Burr (nec Kirby, nec Borm.), (1898[1]) p. 389, Pl. XVIII, figs. 1–3, Pl. XIX, figs. 6–8 and 15, (1901) p. 75, Pl. A., figs. 1–3 ; Borm., (1900[2]) p. 10 partim ; Kirby, (1904) p. 2 partim.

Diplatys greeni, Burr, (1904[2]) p. 280 and 285, (1910[1]) p. 50.

This is the species whose postembryonic development was worked out by Green, together with that of *D. gerstaeckeri* : it was originally referred by me to *D. nigriceps*, but the accumulation of more material and the growth of our knowledge has shown that it is a perfectly distinct species.

Superficially it resembles *D. bormansi*, but differs in the gently sinuate subanal plate ; it is the only species known to me in which the forceps are stout at the base and convex, cylindro-conical, quickly attenuate and slightly arcuate. In *D. bormansi* they are trigono-conical and almost straight.

Type in my collection.

22. *Diplatys rufescens.*

Cylindrogaster rufescens, Kirby, (1896) p. 524, Pl. XX, fig. 2.

Diplatys rufescens, Kirby, (1904) p. 2 ; Burr, (1907[9]) p. 508, (1910[1]) p. 51, fig. 75.

This is a rather large red-brown North Indian species. It is imperfectly known. The type, in the British Museum, is in poor condition.

23. *Diplatys fletcheri*, Burr

Diplatys fletcheri, Burr, (1910[1]) p. 52, fig. 8.

Described and figured in (1910[1]) from a pair taken at Madulsima, in Ceylon, by Mr. T. B. Fletcher. The head is typical, with tumid frons, depressed occiput, and long, straight, sharp keels.

Type in my collection.

24. *Diplatys raffrayi*, Dubr.

Diplatys raffrayi, Dubr., (1879) p. 91; Borm., (1900[2]) p. 9; Burr, (1904[2]) p. 279–282; Kirby, (1904) p. 1; Borelli, (1907[5]) p. 346(?).

Diplatys macrocephala, Kirby, (1904) p. 1 partim.

This is an African species which somewhat resembles, and is doubtless often confused with, *D. macrocephalus*.

I have found a specimen which is certainly the original type, in the Madrid Museum, labelled "Raffray, Zanzibar."

It may be distinguished from *D. macrocephalus*, not by the colour, with which de Bormans was content, but by the slenderer and more hairy body, less inflated last dorsal segment, and depressed and regularly dilated forceps.

I am inclined to doubt Borelli's determination of a West African specimen, since the form is only known decidedly from Zanzibar. It probably replaces *D. macrocephalus* in East Africa.

Type in Madrid Museum.

25. *Diplatys fella*, Burr

Statura mediocri; colore rufo; pronotum fere aeque longum ac latum, antice convexum, lateribus et margine postico rotundatis; segmentum ultimum dorsale haud ampliatum, abdomine vix latius; segmentum penultimum ventrale apicem versus subangustatum, margine postico truncato, angulis rotundatis; forcipis bracchia recta, parallela, haud dilatata depressa, ♂; ♀ ignota.

	♂
Long. corporis	12·5 mm.
„ forcipis	15 „

Size medium; colour reddish tawny.

Antennae with about 25 segments, yellowish, 3rd segment rather short, barely twice as long as broad, 4th and 5th very short, no longer than broad, 6th a little longer, 7th about equal to 3rd, the rest gradually lengthening.

Head brick-red ; frons tumid, occiput depressed, the posterior keels sharp and distinct.

Pronotum yellowish red, a little narrower than the head, about as broad as long, convex anteriorly, narrowed posteriorly, the sides and posterior margin straight, the angles rounded.

Elytra very ample, tawny near the base, darker towards the apex.

Wings long, pale straw-coloured.

Legs slender, yellowish.

Abdomen brick-red.

Last dorsal segment scarcely wider than the abdomen, about as wide as long.

Penultimate ventral segment truncate posteriorly, somewhat narrowed towards the apex, the angles themselves rounded.

Forceps brick-red, darker at the base ; depressed but triquetre, subcontiguous and parallel, attenuate towards the apex, and gently incurved at the apex ; inner margin finely denticulate in basal portion.

Egypt : Cairo.

This species resembles *D. jacobsoni* and *D. rufescens* in the straight forceps, narrow anal segment, and truncate penultimate ventral segment with rounded angles; it differs from the former in having the penultimate ventral segment distinctly narrowed apically, in this respect somewhat approaching *D. rufescens*, but in that species the angles are not rounded. The pronotum is a little shorter and more rectilinear than in *D. rufescens*, and the colour red or tawny. It is decidedly larger than *D. jacobsoni*.

The African species which come nearest to it are *D. bicolor* (in which the pronotum is rounded), *D. vosseleri* (a much larger, darker, and more robust insect), but in both these the penultimate ventral segment is more or less sinuate.

Type in Madrid (?).

26. *Diplatys jacobsoni*, sp. n.

Statura minore; segmentum ultimum dorsale abdomine vix latius ; segmentum penultimum ventrale rectangulare, truncatum ; orcipis bracchia recta, depressa ♂.

	♂
Long. corporis	6 mm.
„ forcipis	1 „

Size small ; build slender ; colour reddish brown ; the whole body clothed with a dense, short, pale pubescence.

Antennae yellowish, typical (10 segments remain).

Head shining brown ; frons smooth and replete ; occiput depressed ; postocular keels sharp.

Pronotum about as broad as long, anterior border convex, sides straight; posterior margin straight, the angles rounded ; slightly narrower posteriorly than anteriorly ; red brown.

Elytra ample, brown, yellowish at the shoulders.

Wings long and narrow, dull brown.

Feet long and slender, yellowish.

Abdomen yellowish at the base, passing into reddish.

Last dorsal segment square, only slightly wider than the narrowest part of the abdomen.

Penultimate ventral segment rectangular, truncate, rather narrow.

Forceps with the branches straight, contiguous, depressed or regularly tapering, points gently hooked, trigonal ; sometimes abruptly attentuated before the apex ; inner margin smooth, ♂ ; ♀ unknown.

Java : Batavia, 29. ii, 08, 1 ♂ (leg. E. Jacobson, in Mus. Leyden).

The forceps may vary considerably. In the specimen originally chosen as the type, the branches, though depressed, taper gradually, and are gently hooked at the apex. In a specimen in the Vienna Museum, the forceps are distinctly dilated in the basal half, and then abruptly attenuated, the apical half thus inclosing an elliptical area, recalling several species of *Forficula.* In other specimens in the Vienna Museum there is every gradation between these two extreme forms.

This delicate little species resembles *D. gerstaeckeri,* Dohrn, in colour and in build, but is even smaller and more fragile. It may be at once distinguished by the truncate posterior margin of the penultimate ventral segment of the male.

It also resembles *D. rufescens,* but the penultimate ventral segment in that species has the angles somewhat rounded, and the last dorsal segment is broader, and the build stronger and bigger.

The narrow last dorsal segment distinguishes *D. jacob-*

soni from *D. raffrayi* and *D. aethiops*, but in those African species the forceps are decidedly flattened, whereas in this species, though somewhat depressed, they are in reality trigonal.

Type in Leyden Museum.

27. *Diplatys annandalei*, sp. n.

Statura mediocri; colore fusco; pronotum pentagonale; segmentum ultimum dorsale abdomine latius et haud transversum; segmentum penultimum ventrale haud angustatum, margine postico truncato; forcipis bracchia recta cylindrico-conica, haud depressa, contigua: ♂; ♀ ignota.

	♂
Long. corporis	10·5 mm.
,, forcipis.	1 ,,

Size medium, colour fuscous.

Antennae . . .

Head black; frons tumid; occiput depressed.

Pronotum pentagonal, slightly longer than wide, narrowed posteriorly; sides straight, posterior margin straight, angles rounded.

Elytra ample, blackish.

Wings prominent, blackish.

Feet yellowish, banded with blackish.

Abdomen purplish red.

Last dorsal segment black, ample, smooth, wider than the abdomen but not wider than long.

Penultimate ventral segment rectangular, posterior margin truncate.

Forceps with the branches rounded above, the under surface flat, short, straight, unarmed, contiguous and yellowish in colour.

Siam: Biserat, Bukit Tapang (leg. Annandale, v, '99. Type 1 ♂, in c.m.).

In the form of the pronotum, this species approaches *D. jacobsoni*, but differs in the form of the penultimate ventral segment: from *D. rufescens*, it differs in the shorter pentagonal pronotum.

Type in my collection.

28. *Diplatys liberatus*, Burr

Nannopygia gerstaeckeri, Borm. (nec Burr, nec Kirby), (1894) p. 372 partim, (1900[2]) p. 11 partim.

Diplatys liberatus, Burr, (1910[1]), p. 52, figs. 90, 90*a*.

This species is founded on a single male, now in the British Museum, which is one of the original specimens taken by Fea in Burma, and recorded by de Bormans under the name of *Nannopygia gerstaeckeri.*

It is more nearly allied to *D. nigriceps,* but the subanal plate is not convex: the rectilinear pronotum distinguishes it from that species, and also from *D. rufescens.* The forceps are short, broad and flat, thus approaching the two following species.

Type in B.M.

29. *Diplatys aethiops,* Burr

Diplatys aethiops, Burr, (1904[2]) p. 280, (1907[9]) p. 508.
„ „ Borelli, (1907[5]) p. 346.

This is a small jet-black West African species, re-

D. aethiops.

sembling the Central American *D. severus* in colour and the structure of the head.

Type in Paris Museum.

In the British Museum there is a specimen from Dar-es-Salaam, which I refer here.

30. *Diplatys viator,* Burr

Diplatys viator, Burr, (1904[2]) p. 278 and 281, (1907[9]) p. 508. (♀ only.)

My inability to place this species in its true position is just retribution for the unpardonable offence of describing a new species without possession of an undoubted male.

The original description includes two distinct species; the true *D. viator* is a dull black female from Madagascar, nearly hairless, with a long and narrow pronotum.

The male attributed to it is from Fernando Po, but the apex of the abdomen, with the essential characters, is missing!

The pronotum is short and rather broad, obtusely

rounded anteriorly, sides straight and converging, as the disc is narrowed towards the truncate posterior margin. Perhaps it is the male of *D. coriacea*, Kirby, or *D. feae*, Bor.

Type in Paris Museum.

31. *Diplatys feae*, Borelli

Diplatys feae, Bor., (1907[5]) p. 347.

Unfortunately described from a single female from Fernando Po, according to Borelli; in colour it resembles *D. nigriceps*, Kirby, and differs in the form of the head and thickness of the femora. The former is purely a sexual character.

Type in Genoa Museum.

32. *Diplatys coriacea*, Kirby

Forficula coriacea, Kirby, (1891) p. 525.
„ „ Borm., (1900[2]) p. 127.
Diplatys „ Borelli, (1907[5]) p. 346.

This is another solitary female, in poor condition, from Sierra Leone. Borelli redescribed a female from Portuguese Guinea, which he attributes to it. The purple tinge, pale shouldered elytra, pale abdomen, darkening apically, suggest that it may be the female of *D. conradti*, with which it agrees better than any other known West African form.

33. *Diplatys occidentalis*, Burr

Diplatys occidentalis, Burr, (1904[2]) p. 280.

This is a small red species, the only one known from the West Indies. The type has unfortunately been damaged.

Type in B.M.

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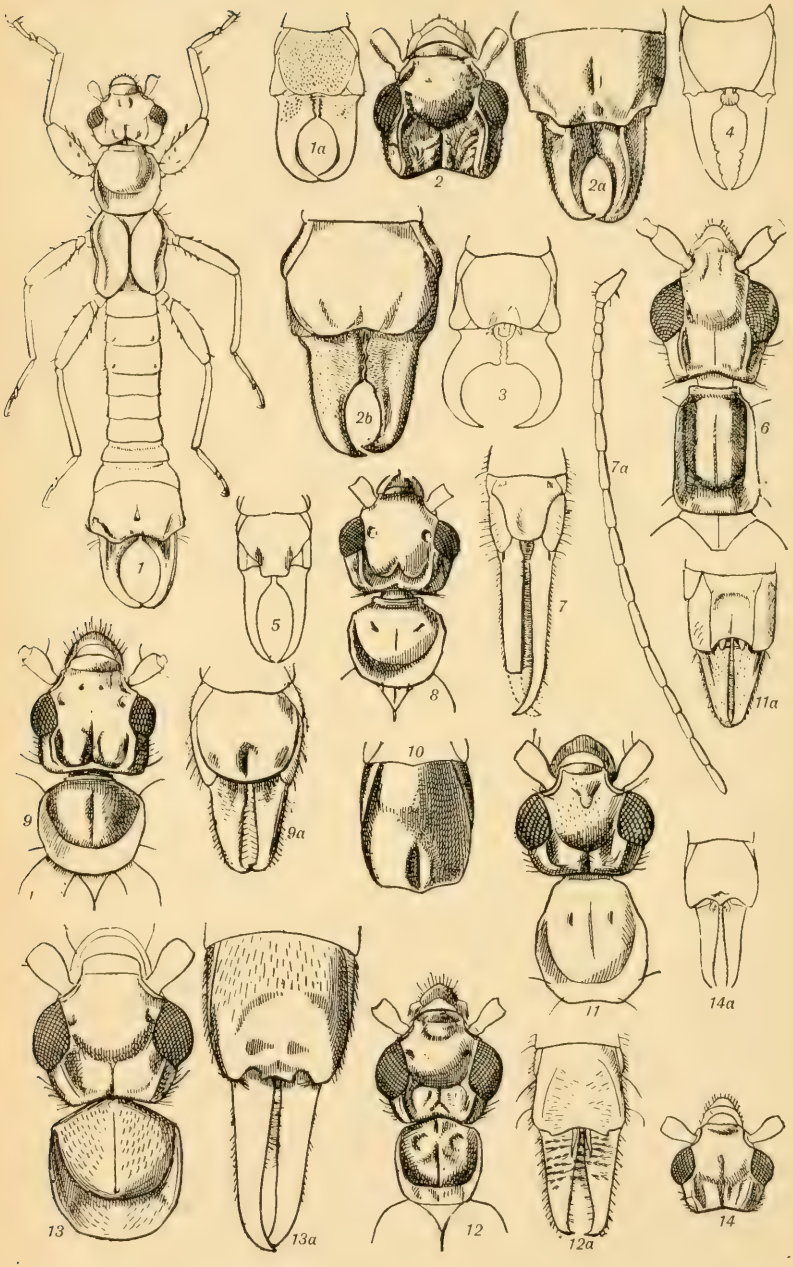


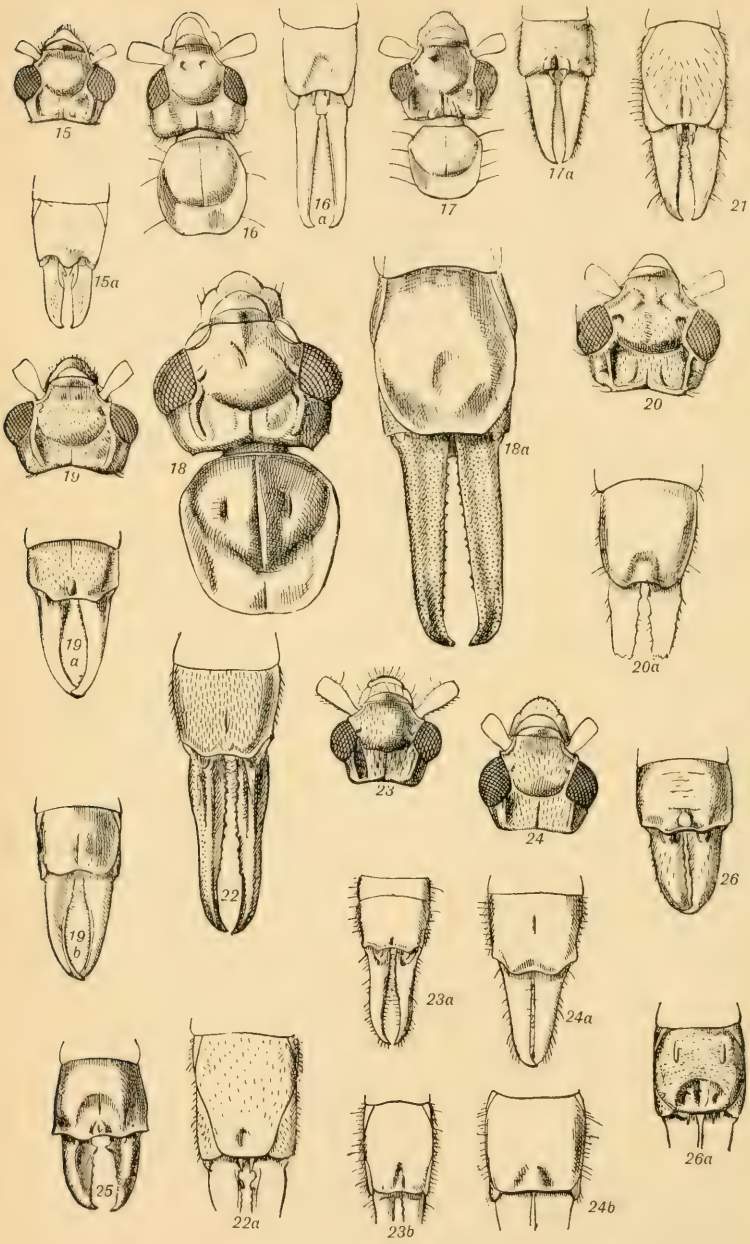
E. Wilson, del.

C. Hentschel.

DETAILS OF DIPLATYIDAE.

Explanation of Plate VII.

Fig. 1. *Diplatys gladiator*, Burr, ♂. Type. Calcutta × 6.
1*a*. id. apex of abdomen from beneath × 6.
2. *D. macrocephalus*, Beauv., ♂. Congo. Head × 8.
2*a*. id. apex of abdomen from above × 8.
2*b*. id. „ „ beneath × 8.
3. *D. falcatus*, Burr, ♂. Type. India. Apex of abdomen from beneath × 10.
4. *D. lefroyi*, Burr, ♂. Type. India. Apex of abdomen from beneath × 10.
5. *D. angustatus*, Burr, ♂. Type. India. Apex of abdomen from beneath × 10.
6. *D. thoracicus*, Dohrn, ♂. Brazil. Head and pronotum × 10.
7. *D. gracilis*, Stål, ♂. Brazil. Apex of abdomen from beneath × 8.
7*a*. *D. gracilis*, antenna × 6.
8. *D. jansoni*, Kirby, ♂. C. America. Head and pronotum × 10.
9. *D. severus*, Borm., ♂. C. America. Head and pronotum × 10.
9*a*. *D. severus*, apex of abdomen from beneath × 10.
10. *D. nigriceps*, Kirby, ♂. Type. Hong Kong. Penultimate ventral segment × 10.
11. *D. conradti*, Burr, ♂. Type. C. Africa. Head and pronotum × 10.
11*a*. *D. conradti*, apex of abdomen from beneath × 10.
12. *D. bormansi*, Burr, ♂. Type. Burma. Head and pronotum × 10.
12*a*. *D. bormansi*, apex of abdomen from beneath × 10.
13. *D. siva*, Burr, ♂. Type. N. India. Head and pronotum. × 10.
13*a*. *D. siva*, apex of abdomen from beneath × 10.
14. *D. gerstaeckeri*, Dohrn, ♂. Ceylon. Head × 10.
14*a*. id. apex of abdomen from beneath × 10.



E. Wilson, del. *C. Hentschel.*

DETAILS OF DIPLATYIDAE.

Explanation of Plate VIII.

Fig. 15. *D. ernesti*, Burr, ♂. Type. Ceylon. Head × 10.
15*a*. id. apex of abdomen from beneath × 10.
16. *D. bicolor*, Dubr., ♂. Abyssinia. Head and pronotum × 10.
16*a*. *D. bicolor*, apex of abdomen from beneath × 10.
17. *D. griffithsi*, Burr, ♂. Type. Borneo. Head and pronotum × 10.
17*a*. *D. griffithsi*, apex of abdomen from beneath × 10.
18. *D. vosseleri*, Burr, ♂. Type. E. Africa. Head and pronotum × 10.
18*a*. *D. vosseleri*, apex of abdomen from beneath × 10.
19. *D. greeni*, Burr, ♂. Type. Ceylon. Head × 10.
19*a*. id. apex of abdomen from above × 10.
19*b*. id. „ „ beneath × 10.
20. *D. rufescens*, Kirby, ♂. Siam. Head × 10.
20*a*. id. apex of abdomen from beneath (from a damaged specimen) × 10.
21. *D. fletcheri*, Burr, ♂. Type. Ceylon. Apex of abdomen from beneath × 10.
22. *D. fella*, Burr, ♂. Type. Egypt. Apex of abdomen from above × 10.
22*a*. *D. fella*, apex of abdomen from beneath × 10.
23. *D. jacobsoni*, Burr, ♂. Type. Java. Head × 10.
23*a*. id. apex of abdomen from above × 10.
23*b*. id. „ „ beneath × 10.
24. *D. annandalei*, Burr, ♂. Type. Siam. Head × 10.
24*a*. id. apex of abdomen from above × 10.
24*b*. id. „ „ beneath × 10.
25. *D. liberatus*, Burr, ♂. Burma. Apex of abdomen from above × 10.
26. *D. raffrayi*, Borm., ♂. Type. Abyssinia. Apex of abdomen from above × 10.
26*a*. *D. raffrayi*, apex of abdomen from beneath × 10.

Note.—The above paper was completed before I received Dr. Friedrich Zacher's Beitrag zur Kenntnis der *Pygidicraniden* und *Diplatyiden* (Ent. Rundschau, 1910, p. 105), in which the author divides *Diplatys* into the following Subgenera : *Diplatys, sensu stricto*, *Verhoeffiella*, (type, *D. aethiops*, Burr), *Paradiplatys* (type, *D. conradti*, Burr), and *Nannopygia*, Dohrn, restored, with a new species. *N. picta*, from East Africa.

These are based exclusively upon the structure of the male genitalia, but Zacher's system does not conflict with mine.

The question of the use of the genitalia for systematic characters in the Dermaptera is too new and too profound to be discussed without great care and consideration.

Dr. Zacher's brief paper above mentioned is a preliminary bulletin of his large and very important work just published under the title "Studien ueber das System der Protodermapteren," in the Zool Jahrb., 1911, pp. 303–400.

Explanation of Plates VII, VIII.

[*See Explanation facing the* Plates.]

IV. *Descriptions of some hitherto unknown, or little known, Larvae and Pupae of South African* Rhopalocera, *with notes on their Life-histories.* By MARGARET E. FOUNTAINE, F.E.S.

[Read October 5th, 1910.]

PLATES IX, X.

BEFORE commencing these notes, I should like to mention that I am largely indebted to the kindness of local entomologists and others for the information obtained, and I would specially like to express my thanks to Mr. A. D. Millar and Mr. G. F. Leigh, F.E.S., both of Durban, Natal, whose kind help throughout my stay in South Africa so greatly added to the success of my two years' stay in that most delightful country. I should also wish to mention Mr. J. Medley-Wood and Miss Franks of the Botanic Gardens, Durban, to whose kindness I am chiefly indebted for the identification of the various food-plants, and for supplying me with their scientific names; all except those from Portuguese East Africa, which I obtained through the kind help of the Board of Agriculture at Pretoria. These notes on the larvae and pupae do not include any of the commoner species which are already well known.

1. *Papilio ophidicephalus*, Oberth.
(Plate IX, figs. 1*a*, 1*b*, 1*c*.)

The ova of this (the largest butterfly in South Africa) are to be found, with careful searching, laid singly, usually on the upperside of the leaves of young saplings of *Clausena inaequalis*; they are very large. The young larva is black, with white at the posterior extremity, and after the first moult shows signs of a white central band, which increases in size and importance with each change of skin, while the black becomes duller and browner. The forepart of this caterpillar is exceedingly broad in proportion to the rest. There are two round projections or "knobs" on the centre of its back, situated on the

brownish-black segment next below the central white band, and these are an unerring guide for its identification in distinguishing this larva from that of the common *P. demoleus.* In the fifth, the last skin, it presents an entirely different aspect, and though to a casual observer it still bears a superficial resemblance to *P. demoleus*, it is easily distinguished from that species, also by the green which now takes a prominent part in its colouring, being much bluer in tone; and the immense breadth of the segments immediately behind the head, besides the two round "knobs," which are now more produced than ever, on the dark russet-brown band, interrupting the green on the sixth segment, this same russet-brown, which now occupies the entire underside of the larva, being much varied with lighter and darker touches and shadings. There are two small detached markings of the green occurring in it on the same segment which contains the knobs. The pupa bears the most remarkable resemblance to a piece of rotten wood of any I have ever seen. The larva, which was hitherto unknown to science, was first bred from ova found by Bersa and myself on the saplings of *Clausena inaequalis*, at Eshowe, Zululand, in the early autumn of 1908. The life-history is as follows:—On March 10 one young larva of *P. ophidicephalus* hatched out from ovum found outside. And on March 19 I returned to Durban, taking with me the young larva, and two ova which hatched out the next day; and the food-plant occurring commonly round Durban I had no difficulty in breeding them. On April 17 the larva which had hatched out on March 10 hung up for pupation. And the last I had hung up on April 25, having hatched out just five weeks and one day previously. They produced imagines the following August and September.

2. *P. echerioides*, Trim.

(Plate IX, figs. 2*a*, 2*b*, 2*c*, 2*d*.)

This butterfly being also unknown in its early stages, when I went up-country in Natal, during the summer of 1909, one of my chief objects was to try and breed it. The butterfly flew, though very sparingly, in Kimber's Bush, at Dargle. And having one day succeeded in capturing a ♀, I thought I would try and get her to lay, giving her a piece of *Vepris lanceolata*, the bush food-plant

of several of the other Papilios; but as she died without laying a single egg, when I captured another ♀ of this species at Donnybrook (4500 feet), on February 24, I thought I would try again to obtain ova, and this time I gave the ♀ *Clausena inaequalis* to lay upon, with the result that on February 28 she laid eleven ova, on March 1 three, three more the next day, and one more on March 6. On March 7 one of the first-laid ova hatched out, the young larva at first was to me indistinguishable from a young *P. cenea* larva—black, with white frills at the head and "tail." It was not without some anxiety that I waited to see if it would eat the *Clausena*, which, to my great joy, it at last decided to do. The others all hatched out later, most of them on March 12, when I had moved down to Jolivet. After a few days the white "frill" behind the head of these larvae turns yellow-ochre, the tail-end remaining white. They fed readily on the *Clausena inaequalis*, and I have no doubt I should have bred nearly all of them, had not their numbers visibly diminished owing to their cannibalistic tendencies, which, unluckily, I did not discover till seven or eight of my small number had mysteriously disappeared, after which I kept them as nearly separate as possible. The larva, as it grew older, entirely lost its resemblance to *P. cenea*, and might much more easily have been mistaken for *P. demoleus*. Description in fourth skin is as follows:—First segments behind head ochre-brown, rather light, and very gradually shaded into white, after which a broad, dark-brown band occupies the better part of two or three segments, streaked and speckled with white. The two last segments are pure white. The full-grown larva of *P. echerioides* is a really beautiful object, of a deep, vivid apple-green; the sides and underneath part varying in colour from a rich ochre to a deep, "sunset-flushed" russet-brown. The pupa is green or brown, and in shape is most extraordinary, like a shrivelled-up autumn leaf. These larvae grew very rapidly, especially after I moved down to Umzinto, a very hot place in the coast-belt; and they all pupated early in April. I naturally expected, at this season, that they would now remain in pupa till the following spring; but whether influenced by the intense heat of Umzinto, or would naturally be producing an autumn brood in the high, upland forests, where *echerioides* makes its home, I am unable to say; anyhow, on April 20, a fine ♂ emerged,

and before I left Umzinto, at the end of the month, every one I had was a butterfly, nine in number, and all perfect, except for a slight malformation in the wing of one ♂.

3. *Charaxes guderiana*, Dew
(Plate IX, figs. 3*a*, 3*b*, 3*c*.)

The remarkable dissimilarity of the sexes is the most striking feature in this species; as the ♀ could apparently be classed as a small species belonging to the *saturnus* group, whereas the ♂ is like a glorified *ethalion*. I was unacquainted with the ♀, though I had taken one or two specimens of the ♂ at Umtali (Rhodesia), in August 1908, when one hot sunny morning, in September, up the "Water Valley," near Macequece (a Portuguese village "over the frontier," where I was staying), Bersa and I simultaneously caught sight of a tawny-brown *Charaxes* flying rapidly from one plant to another on the hill-side, evidently with a view to finding the proper food-plant, whereon to oviposite; so we stood quite still and watched her, and it was not long before, having selected the sapling of a kind of Acacia (*Brachystegia appendiculata*), she paused, and apparently laid an egg, then flew right away out of sight. But there was her egg, right enough, a bright green, unmistakable *Charaxes* ovum; and we were soon searching all the similar plants growing on that hill-side. Neither was it long before Bersa exclaimed, "Here is a larva!" And there, sure enough, was a full-fed *Charaxes* larva—quite unlike any we had ever seen before. The distinctive markings were crimson-pink on the irrorated green surface, consisting of two central pink dots on the fourth segment from the head, in addition to which a continuous line of pink splashes, one on each segment, ornamented this beautiful caterpillar on either side. We soon found some more of all sizes, though they scarcely seemed abundant on that hot spring morning (September 8, 1908). This is the life-history of the green egg, which is now a ♂ *guderiana* in my collection:—Hatched out on September 13, exactly like any other young *Charaxes* larva to look at, of a dull ochreous colour, with dark-brown, almost black head and tail. First moult satisfactorily effected on the morning of September 18. For the second time, again in the early morning, on September 22, head still dark brown in colour; but, while in this skin,

gradually changed to green, heavily outlined with dark crimson. The third moult took place on September 27, and for the fourth and last time on October 3, the larva now being twenty days old. It fed for ten days in the final skin, hanging up for pupation on the evening of October 13, exactly one month from the day it had hatched out. The butterfly, which proved to be a ♂, emerged at Beira, on October 24. In the meantime, from the larvae we had found, I had bred a fair number of both sexes. The pupa is the usual shape of a *Charaxes* pupa, green, with white lines indicating the wing-cases, if allowed to pupate on the food-plant; but if removed when still a larva to the pupa cage, which was almost in the dark, the pupa assumed a pale, dull drab colour. A rather curious instance of the attachment of individual caterpillars to each other was observed by me when I was breeding these *guderiana*. Two larvae about the same size had formed one of these strong attachments to each other, insisting invariably in sharing the same nest, no matter how far apart I might place them on the fresh food-plant. And when one pupated and was duly removed to the chrysalis cage, his friend became very restless, and soon showed such unmistakable evidences of following his example, that I removed him also to the chrysalis cage, round which he wandered vaguely for some time, finally ending in hanging up as close as possible to the pupa of his former friend. The two butterflies resulting were both ♂♂. Much could be written by close observers concerning the wonderful instinct and foresight of caterpillars, especially those belonging to this noble genus *Charaxes*. How the larvae of *C. candiope*, when feeding in the winter on their food-plant (*Croton sylvaticum*), in order to prevent their pupae falling when the plant sheds its leaves, will first take infinite pains to attach the stalk of that particular leaf which it intends to hang upon, to the branch it is on, by a silk web as firm as the one by which its pupa will be attached to that stalk further up. Also I once observed a full-grown larva of *C. ethalion* which feeds on *Albizzia fastigiata* (the Flat-crown Acacia), walking slowly along a bare stalk, scanning as it went on either side to find a leaf; but all the leaves on that stalk had already been eaten, so he travelled quite to the end without being able to appease his hunger; then he turned back and quickly retraced his steps, with every evidence

of annoyance and disgust, till once on the main stalk, he deliberately turned round and began to gnaw through the one he had just left, till it dropped off and fell to the bottom of the cage ; evidently he did not intend to run any risk of ever going on that fool's errand again ! I believe this was by no means a unique incident in the life of a caterpillar, for I think it is commonly done by them, and accounts for the old stalks we so often find lying at the bottom of breeding cages.

4. *Charaxes xiphares*, Cram.

(Plate IX, fig. 4.)

This butterfly occurs in some abundance in certain localities up-country in Natal. At Dargle in a peach orchard belonging to Mr. and Mrs. Kimber, to which they most kindly gave me free access, I found the ♀♀ of this butterfly in dozens, feasting on the peaches, but the ♂♂, strangely enough, were exceedingly rare ; this I afterwards understood being the experience of all entomologists who have ever taken this huge *Charaxes*. As it had never been bred and its food-plant was quite unknown, I did not for some time succeed in obtaining ova, though I had no less than seven captive ♀♀ feasting every day on my sugar and water and laying nothing ! I gave them a selection of all the bush plants I could think of, as at all likely to be the food-plant of a *Charaxes*. But I had not amongst them hit on the right one, and this at last I discovered in the usual way by watching a wild ♀ apparently laying on a shrub growing in the high bush, on the top of a mountain (5200 feet). It was a big shrub with sweet, "myrtle" scented leaves ; and though I could not find her ovum there seemed but little doubt that it was correct, as my captive ♀♀ who had just began to lay now, but very sparingly, and nearly always on the net of their cage, at once began to cover this "myrtle" plant with large pale straw-coloured ova. And the matter was quite decided by our finding a few *Charaxes* ova on it, outside on the mountain a day or two later. So when the united efforts of my captive ♀♀ had resulted in 99 eggs, I let them all go, and only hoped I should find our "myrtle" plant easily at Donnybrook, which place I now went on to, only to encounter the most hopeless weather with deluges of rain Two *xiphares* larvae from ova found outside hatched out

the day I left Maritzburg. But I soon found that everything in the life-history of this beautiful up-country *Charaxes* was of much slower development than of those inhabiting only the coast districts; in which invariably the period between laying and hatching, and also between each moult is five days, or even occasionally (especially with *C. candiope*) not more than four, whereas with *xiphares* these intervals were much longer, as to begin with the ova did not hatch out under 10 or 12 days. Most of those I had, hatched on February 28 (16), and March 1 (12), after which the remaining ova, though many of them had changed colour and therefore were evidently fertile, showed no further signs of coming out at all; indeed I have a theory that in their natural state, they hibernate as ova, or as very young larvae; but I have only just begun upon what still remains to be discovered about the early stages of this butterfly, for as I soon left for Jolivet, a much warmer place, my larvae continued to feed up well, though very slowly, and the first moult did not occur till some of them were 12 and some even 14 days old; the next moult, however, was rather shorter, mostly from 8 to 10 days in duration, but it varied considerably in different individuals, as was the case of these larvae throughout their existence. For instance, the first to enter into the final skin was on April 4, and this was one of the last to have hatched out, and the next day, April 5, the last of them (with one exception which was far behind the rest) changed his skin for the third time only, this one being one day older than the one who had just entered his final moult the day before, and the same age as several more who made that change the same day. I was now in the intense heat of Umzinto, and the *xiphares* did not seem any the better for it; they were still feeding up extremely slowly, and several died for no apparent reason, in fact they seemed to be "feeling the heat," and nothing would induce them to pupate, which as I now had many young larvae of *C. candiope*, *C. cithaeron*, *C. brutus*, and *C. ethalion* to attend to, I was especially anxious for them to do, though I had found their food-plant (*Cryptocarya woodii*, *acuminata*), Kaffir name "Umquotungwa," everywhere down on the coast, growing more abundantly than up-country. These larvae were certainly very like their close ally *C. cithaeron*, the dorsal marks being practically the same, but the green was quite different, being much

brighter with more yellow in it, and none of the whitish touches introduced as in *cithaeron* larvae. I now began to see that, after all the trouble we had had, my success with these *xiphares* was going to be anything but unprecedented; they did not like what to them was the unnatural heat of the coast, and though they still continued to feed, no attempt at pupation took place till May 4, the day after my return to Durban. The pupa was much smaller than I knew well in order to produce a full-sized butterfly of this large species it had any business to be. The remaining larvae got on still worse in Durban, and as the winter advanced almost gave up feeding altogether; Mr. Leigh declared they were trying to hibernate, and indeed I think he was right; however, all either died, or pupated at last, and I hoped as they were such small pupae that they would produce ♂♂, as I had only succeeded in getting one good specimen of that sex, owing to its extraordinary scarcity; but in this I was disappointed, I bred nothing but rather undersized ♀♀ (the last to emerge was before the end of June), and it has occurred to me that for some reason or other this species may possibly eventually be proved to be partially parthenogenetic, but this, on my part, is only a suggestion, and in order to be proved will have to be followed up and worked out by some one else.

5. *Salamis anacardii*, Linn.

(Plate IX, figs. 5*a*, 5*b*.)

I believe the full-grown larva of this butterfly was not previously known to entomologists, at least not when I was at Durban in February 1908, for though there was no doubt that its food-plant is *Isoglossa woodii*, ova having frequently been obtained, the young larvae had always invariably declined to eat, so that up to now all attempts to rear them had proved unsuccessful. However, on February 3, 1908, I found a full-grown larva in Stella Bush, near Durban, which I describe as follows:—Head shiny, burnt-sienna in colour, the ground-colour velvety russet-brown, with three yellow stripes close together on each segment, two long stiff brown "antler" projections in front, with rough pectinated spikes all over the body of the larva, though the two in front were considerably longer than the rest. It pupated two days after I had it, the pupa

being suspended from a stalk of the food-plant, and was of a rich soft burnt-sienna, varying in tone according to pattern, and was in shape not unlike the pupa of a *Precis*. The imago (a ♂) emerged on February 17, after having remained about 12 days in pupa.

6. *Precis octavia*, Cram; 7. *P. archesia*, Cram.; and 8. *P. cloantha*, Cram.

(Plate IX, figs. 6*a*, 6*b*; 7*a*, 7*b*; Plate X, figs. 8*a*, 8*b*.)

I bred all these *Precis* during my stay up-country in Natal, in the summer of 1909. From ova laid by a captive ♀ of *P. octavia*, at Dargle, I obtained about 70 pupae, and of these, the six first to emerge (about the middle of March) belonged to the *octavia* or wet-season form, while all the rest were *sesamus*, or dry-season form. The food-plant is *Plectranthus calcinus*, the larva is dark-brown, more or less encircled with yellow stripes, it is spiky, with two long projections in front. Of *P. archesia* I bred a short series from larvae found at Jolivet, feeding on another kind of *Plectranthus*, apparently from ova laid by *P. v. pelasgis*, Godt., ♀♀, as several were still busy ovipositing over the same plants, from which I took the larvae, and *P. archesia* (type) was not in evidence at all; however, in April and early May, all I bred were of this last-mentioned dry-season form, with one beautiful ♀ intermediate between the two. The larvae were black, finely irrorated with white, and had the usual spikes and frontal projections, the pupa had no gilt ornamentations as in *P. octavia*. I also obtained ova of *P. cloantha*, from a ♀ I caught at Dargle, having by observing the wild ♀♀ ovipositing discovered the food-plant to be a small weed which grew in amongst the grass all over the veldt (*Justicia pulegioides*). I had but poor success with these larvae, in fact only bred six or seven out of some dozens, as so many died off at Donnybrook, why I do not know, unless it was from the intense cold which occurred there during my visit. The full-grown larva of this species is very handsome, head pale, bright, burnt-sienna; the underside and forelegs are dark-brown; it is striped throughout alternately with broad rich dark-brown and deep yellow-ochre; frontal projections much shorter than in the other *Precis*, not stiff or pectinated, but instead knobbed at the tip. The pupa is quite unlike any other *Precis* pupa I have

seen, pale, yellowish-green, thinly streaked and slightly spotted with dark reddish-brown; also in shape with fewer and less acute angles.

9. *Pseudacraea tarquinia*, Trim.; 10. *P. imitator*, Trim.; and 11. *P. trimenii*, Butl.

(Plate X, figs. 9*a*, 9*b*; 10*a*, 10*b*, 10*c*; 11*a*, 11*b*.)

The discovery of the interesting larvae of all these three species of *Pseudacraea*, I can in no way lay claim to, as it is entirely due to the keen observation, perseverance and ability of Mr. G. F. Leigh, F.E.S., who has, however, kindly given me permission to describe them. *P. tarquinia* was the first to be discovered by Mr. Leigh, at Pinetown Bridge, Natal, feeding on *Mimusops obovata*, and afterwards in Stella Bush, near Durban, on two kinds of *Chrysophyllum*. The larva full grown is a remarkably striking object: head pale-pink, streaked with crimson, "neck" pale-grey, above the six legs, behind which spring out two long curved projections, the tips of which reach to and extend beyond the head, crimson-pink in colour, and pectinated; the back of this larva is deep vivid green, of a "wrinkled" appearance, with a bright pink broken-up streak along the sides, where the green stops to give place to a pale pearly-grey; a short distance from the tail end, are two stiff, very pale-yellow projections, not so long as those behind the head. The young larvae in this species do not differ greatly from the full-grown ones, save that the frontal "antlers" are much longer in proportion to its tiny size, and the green is somewhat paler. They feed when young at the extreme tips of the leaf, gradually eating it away, but taking care to leave the mid-rib, till it becomes an inch or more in length, and the larva when not feeding rests at the extreme end of it, but when they get older this habit is more or less abandoned. The egg, which is pale straw-colour, is also laid at the extreme tip or edge of a leaf. Mr. Leigh also discovered *P. imitator*, and most kindly instructed me how to look for and obtain it in Stella Bush; *Chrysophyllum natalense* was the plant we usually found it on. Its habits are similar to those of *P. tarquinia*, but the young larvae differ greatly from the full-grown ones in the last skin. The egg is pink, and turns black before hatching. The head and "neck" of the larva in early moults are dull, pale greenish-grey

projections short and dull white, tapering to a blackish point, broad mid-dorsal stripe green, of a much bluer tone than the green of *P. tarquinia*; this is outlined with dull white, and the underside is dull whitish, with brown-madder streaks and shadings; about the centre of the caterpillar is a remarkable and most curious arrangement, a kind of three-cornered piece of skin, which is whiter and seems also to stand out from the rest of the surface, looking as if it would lift up. This also remains in the full-grown larva, the prevailing colour of which is a soft dull russet-brown, beautifully marked with a rich, dark-brown design, with just a suspicion of olive-green introduced. At this stage of its development, the larva leaves the tip of the mid-rib, and generally reposes at the stalk end of the leaf instead, often sitting in a most extraordinary twisted position, with head and tail end erect, looking exactly like a short brown twisted twig. The larva of *P. trimenii* I never had the good fortune to find myself, though I have been out with Mr. Leigh when he has done so, and on one occasion Bersa and I held down for him the lower bough of a *Chrysophyllum natalense* tree, which proved to have a full-grown *trimenii* at the end of it, about which, however, a bargain was struck there and then, so that that specimen is now a fine darkly-coloured ♀ in my collection. I never saw this caterpillar except in its last skin, but the following is an excellent description, since sent to me by Mr. Leigh, with permission to publish it:—"It is nearly black in colour when just hatched out, and immediately covers itself with its own frass; in the second skin it is grey, and looks more like a lot of large, grey frass all joined together, but the head is large, also grey. It gets away from its food in a more extraordinary manner even than *P. imitator*, on a web of its own, about the thickness of cotton, which is also grey in colour; I measured one and found it seven and a half inches in length, and the larva at rest in the grey skin at the extreme end. It does not look like a [butterfly] caterpillar at all, as it sits all of a heap, with its two hind-segments up in the air, like the larva of our *Notodontidae*. The third skin is brown, and the white markings at side appear, also the four projections behind the head." The full-grown larva is a most extraordinary-looking creature, as it sits at rest in the same queer twisted position assumed by *P. imitator*, looking exactly like an old rough

piece of twig from the tree it feeds on, with thick "mossy" projections on every segment, the four next behind the head longer than the rest, and curved forward. It is rich olive-brown in colour, beautifully shaded, and it has one or two crimson dorsal spots; the three-cornered side piece is greyish-white, looking exactly like a small piece of lichen on the rough surface of the "twig"; the head is slate-grey. The pupae of these *Pseudacraeae*, which are suspended generally quite at the tip of extreme edge of a leaf, are as follows:—*P. tarquinia*, long, thin, and boat-shaped, tapering to a point, and it is green in colour, some specimens being touched and outlined slightly with pink. *P. imitator* is also green, rather deeper in colour, and the shape is quite different, having two sharp, well-defined projections from that part which encloses the abdomen of the butterfly, while the pointed end is twisted and flat, and not so pointed as in *P. tarquinia*. The pupa of *P. trimenii* is much blunter and more substantial-looking than the other two, it is of a deep rich green, the abdomen portion frosted with white and very pale ochreous dashes; about the centre of outline of wing-cases, is a dark, brown-madder rather elongated mark, surmounted and half surrounded by a suffusion of pale pinkish-brown, the tip is blunt, slightly turned up, and outlined with brown-madder.

12. *Eurytela dryope*, Cram., and 13. *E. hiarbas*, Dru.
(Plate X, figs. 12, 13.)

I bred a good many of both these little butterflies, from ova laid by captive ♀♀. They are considered by Mr. Leigh to belong in all probability to the same species, and indeed I could never have separated their larvae if once mixed together; in all stages they were exactly alike, and though in the last moult individually they vary enormously, I have bred both forms of the butterfly indiscriminately from every variety of the larva; against this, however, I must state, that as far as my experience goes, the ova laid by *E. hiarbas*, always produced *hiarbas*, whereas those of a *dryope* ♀ invariably produced *dryope*. The larvae of these butterflies in their early moults are dull, ochreous-white, with brown blotches here and there; when full-grown they are covered with short spines, and the two long antler projections on the head become more prominent; their colour now varies from bright green to brown, slightly mottled and streaked with yellow-ochre,

along the sides is a white stripe, sparsely speckled with black, and broken into between each segment. Underneath it is green or dull brownish as the case may be.

14. *Acraea nohara*, Boisd.
(Plate X, figs. 14*a*, 14*b*.)

This larva feeds like several others of this same genus on *Wormskioldia longepedunculata*, a small, wayside flower, salmon-pink in colour, which grew abundantly in and about Macequece, a village in Portuguese East Africa. The larva is most difficult to describe, longitudinally streaked with pale and dark ochre-yellow, finely outlined with thin black lines, the spines are also black; they feed by preference on the flower itself of their food-plant, the salmon-pink colour of which is almost identical in tone with the salmon-pink colour of the freshly-emerged butterflies. The pupa which is suspended, is very long and thin in shape, wing-cases pale slaty-grey, veined with black, and the abdomen cream-colour with rows of ochreous-yellow dots, encircled in black.

15. *A. caldarena*, Hewits.
(Plate X, figs. 15*a*, 15*b*.)

The larva of this butterfly also feeds on the flowers and leaves of *W. longepedunculata*; it is of a soft pink rose-colour, shading into yellow at the extremities, underneath it has a longitudinal white stripe between the legs, extending from head to tail; the spines are black. The pupa is not quite so elongated in shape as that of *A. nohara*, the wing-cases are pale, dull drab veined and outlined with black, the abdomen is deep cream-colour, with the rows of orange spots so heavily outlined with black as to be almost coalescent. I found this larva, but not at all commonly, at Macequece.

16. *A. anemosa*, Hewits.
(Plate X, figs. 16*a*, 16*b*.)

This very handsome, extremely active little larva occurred very commonly at Macequece, on almost every available piece of its food-plant, a creeper, identified at the Board of Agriculture at Pretoria as (most probably) *Modecca abyssinica*. I first discovered it, in the usual way, by watching a ♀ laying eggs; these are laid in batches of various sizes, some with about ten eggs together, others

Explanation of Plate IX.

Fig. 1*a*. *Papilio ophidicephalus*, larva, young, p. 48.
1*b*. „ „ „ adult, p. 49.
1*c*. „ „ pupa, p. 49.
2*a*. *Papilio echerioides*, larva, young, p. 50.
2*b*. „ „ „ adult, p. 50.
2*c*. „ „ pupa, p. 50.
2*d*. „ „ „ p. 50.
3*a*. *Charaxes guderiana*, larva, p. 51.
3*b*. „ „ pupa, p. 52.
3*c*. „ „ „ p. 52.
4. *Charaxes xiphares*, larva, p. 54.
5*a*. *Salamis anacardii*, larva, p. 55.
5*b*. „ „ pupa, p. 56.
6*a*. *Precis octavia*, larva, p. 56.
6*b*. „ „ pupa, p. 56.
7*a*. *Precis archesia*, larva, p. 56.
7*b*. „ „ pupa, p. 56.

Explanation of Plate X.

Fig. 8*a*. *Precis cloantha*, larva, p. 56.
8*b*. „ „ pupa, p. 56.
9*a*. *Pseudacraea tarquinia*, larva, p. 57.
9*b*. „ „ pupa, p. 59.
10*a*. *Pseudacraea imitator*, larva, young, p. 57.
10*b*. „ „ „ „ p. 58.
10*c*. „ „ pupa, p. 59.
11*a*. *Pseudacraea trimenii*, larva, p. 58.
11*b*. „ „ pupa, p. 59.
12. *Eurytela dryope*, larva, p. 59.
13. *E. hiarbas*, larva, p. 59.
14*a*. *Acraea nohara*, larva, p. 60.
14*b*. „ „ pupa, p. 60.
15*a*. *Acraea caldarena*, larva, p. 60.
15*b*. „ „ pupa, p. 60.
16*a*. *Acraea anemosa*, larva, p. 61.
16*b*. „ „ pupa, p. 61.
17*a*. *Leptoneura dingana*, larva, young, p. 61.
17*b*. „ „ „ adult, p. 61.

having as many as twenty-five or even more. The larva is very easy to rear, and feeds up very rapidly, and it remains only about eight days in pupa; but where the difficulty come in, is that the supply of its food-plant should meet the demand, as it is a dark-coloured very inconspicuous little creeper, most difficult to find, and when a piece is discovered it is generally already sustaining two or three or more larvae of this same species. In colour it is a bright, shiny red-russet, shaded into deep yellow at the extremities, the spines are long, furry and black. The pupa is dingy-white in ground-colour, the wing-case the same, but heavily outlined and veined in black, the rows of abdominal spots are deep orange, very heavily surrounded with black.

17. *Leptoneura dingana*, Trim.

(Plate X, figs. 17*a*, 17*b*.)

I was able to discover the larvae of this butterfly and something of their habits owing to a ♀ I caught at Barberton in the Transvaal having laid three ova on November 5, 1908. These hatched out in thirteen days, on November 18, and *dingana* being a Satyride, I thought they would probably be grass-feeders, and such they proved to be. All three lived and were doing well, showing no special preference for any particular kind of grass, which was as well, as they continued feeding for six months, in fact all through the summer, and travelled with me wherever I went. Early in May they evidently prepared to hibernate, as full-grown larvae, but owing I suppose to the unnatural conditions of a bed of cotton wool to sleep on, instead of the cool earth, they all died before the winter was over, so that I, therefore, never saw the pupa. The larva during its early moults is a pale, creamy yellow, with longitudinal thin, fine black lines, and some touches of deeper yellow, the head also is deep yellow. In the last skin this caterpillar is brown, much varied with deep, dark-brown, and black streaks, the head now is reddish brown-madder, covered with short, very fine hairs, tail slightly forked.

1, The Studios, Sherriff Road,
West Hampstead, N.W.,
June 1910.

Explanation of Plates IX, X.

[*See Explanation facing the* Plates.]

V. Hymenoptera aculeata *collected in Algeria. The* Sphegidae. (*Being* Part V *of the work commenced by the late* EDWARD SAUNDERS, F.R.S., *in* Trans. Ent. Soc. 1901, *p.* 515.) *Revised and completed by the* Rev. F. D. MORICE, M.A., F.E.S.

[Read November 2nd, 1910.]

IN the first paper of the work above referred to (*Heterogyna and Fossores to the end of Pompilidae*) Mr. Saunders expressed his hope that I would follow it shortly with one upon the *Sphegidae*. But on attempting to do so, I soon discovered that I was undertaking a task to which I was unequal, and so we agreed instead that he should go on at once to the other parts of his subject (the *Diploptera* and *Anthophila*) and publish his account of them without waiting for the completion of my paper. Later still, to my great relief, he consented to a further modification of the plan: that I should continue the work gradually till his other papers had appeared, after which he would co-operate with me in finishing it. So the matter stood when, in 1908, Saunders's third paper (the *Anthophila*) appeared in these Transactions; and we then definitely settled arrangements for a division of labour, Saunders undertaking certain Genera, and I others, with the idea of speedily publishing a joint-paper which should form the concluding part of the entire series.

Saunders's illness and death made it impossible to carry out the plan as it was intended; but he was at work upon his share of it up to the last. He had practically completed several "Descriptions of new species," which were found among his papers, and appeared in the Society's Transactions for 1910, Part IV. He had also drawn up an annotated list of all Mr. Eaton's insects (except a few which at the time were in my hands for determination) and had included in it certain of my own specimens, which he had examined and taken note of before leaving home. The annotations were mainly records of localities and dates of capture copied from the labels pinned under the specimens. Others were extracts from a MS. diary

kept by Mr. Eaton during his stay in Algeria from Jan. 1893 to Aug. 1897, giving much detailed information as to the plants visited by particular insects, their appearance and behaviour during life, etc., etc. Occasionally (but very seldom) a remark of Mr. Saunders's own was added; and these seemed generally not intended for publication, but merely to identify a particular specimen about whose treatment he had not made up his mind (*e.g.* "Sp.? under *arenarum* in my box"; "Large insect (like *emarginata*)"; "Black wings!"; "Stylopised"; "Determined for me by Kohl"; etc.). The list was evidently written quickly, with many abbreviations, notes of interrogation, etc., sometimes in ink, sometimes in pencil or blue chalk, and blank spaces left for subsequent insertions of names, dates, authorships of species, and the like. In fact it has the appearance of a "rough draft" intended to assist him in preparing his final "copy," and would scarcely be intelligible to another person apart from the actual collections to which it refers. But by working carefully through it with those collections,* and also with Mr. Eaton's original diary—the latter having been placed in my hands along with all Saunders's entomological MSS. after his death—I believe I have been able to incorporate its substance in this paper, very nearly in the shape in which its author intended to publish it.

This MS. list, then, compiled by Mr. Saunders, supplemented by additional records of my own captures, and revised and emended as to certain details after comparing it with the labels attached to the actual specimens referred to and verifying its citations from Mr. Eaton's diary, forms the nucleus of the present paper. The parts of it for which I am solely responsible—besides the above purely editorial work—are these. (1) The introductory remarks, viz. everything preceding the list itself. (2) All descriptions of new or otherwise remarkable forms—Saunders's own work of this kind having appeared already in the 1910 volume of these Transactions. (3) The arrangement in order of the Genera represented, and the occasional addition of subgeneric names in brackets. In all such matters I have

* The authorities of the Natural History Museum, who now possess all the *Hymenoptera* of the Saunders Coll., most kindly allowed the *Sphegidae* to remain in my charge till this paper should be completed. Otherwise it would have been practically impossible for me to write it.

followed Herr Kohl's work ("Sphegiden-Gattungen," Wien, 1896). (4) Practically the entire treatment of certain Genera, which had been left to me by our arrangement, especially *Ammophila*, *Cerceris*, and the Genera included in various works of Kohl and Handlirsch, e. g. *Diodontus*, *Nysson*, *Spheeius*, *Stizus*, etc. (But I should add that I have rarely arrived at a determination of any doubtful form even in these Genera without at some time consulting Saunders on the subject, so that many of the determinations were really rather his than mine.)

My whole collection of *Crabro* (sensu latiore) has been recently examined and determined for me by Herr Kohl; and, as will be seen below, some also of the names here given for specimens in Saunders's collection rest on his authority. The same great hymenopterist has at various times given me or named for me examples of a great many little-known Mediterranean *Sphegidae*; and having these "quasi-types," as they may be called, before me, I have been enabled to arrive at determinations, which I hope are correct, of several specimens left unnamed by Saunders. Whenever I have ventured to question any of my colleague's identifications, it has nearly always been on the authority of some specimen of my own determined by Kohl, Handlirsch, or Schletterer.

I have thought it right to enter into the above details, which might otherwise seem rather tedious, because I am anxious not to claim for myself the credit for work which is really that of my friend, and yet not to cast upon him the responsibility for imperfections arising simply from the fact that I, and not he, have put this work into its final shape.

On a rough calculation it appears that very nearly 200 *Sphegidae*-spp. belonging to 33 genera are recorded below. Of these, more than half occurred *at Biskra only* (!); and that half comprises nearly all the finest and most striking forms, and quite a surprising number of species and even genera (*Kohlia*, *Laphyragogus*, etc.) which were either altogether or almost unknown to science when we found them. Several of these almost tropical insects occur also in Egypt, on the border-line between the Delta and the deserts east and west of Cairo, and, together with the species most nearly related to them in the same districts, appear to form a definite "Saharan" group; which probably extends all along the northern fringe of Central

Africa, and differs considerably in general appearance (colour, silvery pilosity, etc.) from the more European-looking fauna of the coast. As a rule, in these "Saharan" forms, the prevailing colours are pale lemon-yellow, creamy-white, and red (or testaceous) with very little black, blended harmoniously together, and with the contrasts between them further softened and disguised by their silvery clothing; whereas of the "European" forms, some exhibit strong contrasts of black and red, others of black and yellow, and many (generally small species) are simply black. On the other hand, it is puzzling to find (along with the gaily-coloured yet evidently "cryptic" Saharan forms, and confined to the districts frequented by them) a certain number of very large, quite black (or black with silvery hair-patches), and altogether most conspicuous insects, usually with the wings very dark also—belonging to many different genera in which such a coloration is quite abnormal or even unknown in Europe, though apparently yet further south than the Sahara it is not uncommon.

Of the genera which occur both in Europe and in North Africa, some (as might be expected) are represented by many more species in the former, others in the latter. Thus the timber-frequenting *Sphegidae*, such as *Trypoxylon*, *Crabro* (groups of *Crossocerus*, etc.), *Passaloecus*, *Pemphedron*, etc., figure little in the list of Mr. Eaton's captures, and scarcely at all in my own; though this, perhaps, is partly because of a collector's natural tendency to be attracted by striking and conspicuous insects and to neglect such as look to him ordinary and uninteresting. On the other hand, of certain sand-burrowing genera, e. g. *Ammophila*, *Stizus*, and *Cerceris*, the Algerian species are both exceedingly numerous and far more diversified in appearance than would be expected by a Hymenopterist familiar only with European forms. It might be supposed that the same would be the case with *Mellinus*, but as a matter of fact neither Mr. Eaton nor myself encountered that genus in Algeria at all. Our captures of *Gorytes* include several very beautiful or otherwise remarkable forms, but hardly any of the numerous rather common and deceptively similar species which figure so largely in the European fauna.

Both *Tachytes* and *Tachysphex* are represented in Algeria by many remarkable species. Some of the finest are

known also from Egypt; others were described as new by Saunders in last year's Transactions (Part IV), but unhappily he did not live to describe the finest of all. (See below, *Tachytes superbiens*, n. sp.)

Owing to the long time which has elapsed between the forming and recording of these collections, several insects which, when we found them, were "new to science," have since been discovered and described by others, e. g. *Ancistromma europaea*, Mercet, *Cerceris hartliebi*, Schulz, etc. The same may have occurred in the case of some species here treated as new, but I hope not often. The literature on the subject is scattered, and my own acquaintance with it far from profound. But Saunders kept careful note of such descriptions as they appeared, and inserted them in an interleaved MS. catalogue of Palaearctic Aculeates (extracted from v. Dalla Torre's work) which I now possess; and correspondence with Kohl, Mercet, Schmiedeknecht and others has kept me generally pretty well informed as to the works that have been published of recent years relating to the *Sphegidae* of Europe and N. Africa. If I have inadvertently overlooked any previously published description of any of these insects, I trust the author will accept this apology.

It may be thought that I have been almost over-careful to record all Mr. Eaton's notes on "colour of eyes in life," "plants visited by particular species," etc. Taken as a whole, however, they embody a large number of facts, which may possibly hereafter become of value in ways which cannot now be foreseen, as bearing on problems not yet raised by scientific workers. Mr. Saunders, I know, was at first very hopeful on this head; though I believe he latterly felt some doubt as to the utility of enumerating, one by one, all the countless species resorting to such universally attractive flowers as *Ammi visnaga* at Biskra, etc. Still one never knows what dry bones of fact may have life breathed into them by some future Darwin; so I give these records as I find them.

It must of course always be remembered, that predaceous insects like the *Sphegidae* may be attracted to a particular plant for various reasons—*e. g.* in quest of other insects frequenting it, as well as to suck the nectar of its flowers. But collectors who are also botanists will certainly find it helpful on commencing work in a locality which is fresh to them to have a preliminary idea of the

particular plants which are most likely to reward special observation. And to take the particular case already alluded to, there can be no doubt that the simplest way to ensure a magnificent series of the handsomest Algerian *Hymenoptera*—I do not say the best way of securing really important scientific results—is to spend day after day of long hours of sunshine among the almost monotonous patches of *Ammi visnaga* which fill the Oued of Biskra in the months of May, June, and probably July in a favourable year. No skill is required in taking the insects under such circumstances, and the only difficulty is to make the work of determining and preparing the specimens keep pace with the endless stream of fresh captures.

A matter to which I should like to invite attention is the great length of the period throughout which certain species appear to be on the wing annually in Algeria, examples of them having been taken in almost every month of one year or another. Few, if any, *Sphegidae* appear in our own country for more than a few months; and most of them are rather summer or autumn than spring insects. That a species should *appear* earlier in Algeria seems natural enough, but one would rather expect it to be also "over" earlier, which apparently is seldom the case. It looks as though, in some cases, two or even three generations of the same species must be produced within a year; for several of the specimens taken at quite late dates (August or September) are in as fresh a condition as or even fresher than earlier ones. At the same time many species, and among them some of the most characteristically Saharan forms, seem, from the dates here recorded, to have a comparatively short season—generally appearing first towards the end of May and becoming plentiful a week or so later, but not occurring in the spring or the late autumn. As these records extend over six successive years, statistics founded upon them may have some value; but they would of course be more reliable if Mr. Eaton or myself had spent longer periods than we did on any single hunting-ground, or had continued indefinitely to secure further duplicates of species which we had already taken "to satiety." Probably hymenopterists who are fortunate enough to reside in Mediterranean countries could supply information on these matters which would be interesting to those who can only visit

them occasionally; but I have not succeeded in getting much light on the subject from any published material to which I have access at present.

AMMOPLANUS PERRISII, Gir.

1 ♀. Alger, 15. iv, 98. F. D. M.

Taken flying about a wayside bank on the steep direct ascent to Bouzarea. Though I frequently revisited the spot no other specimen occurred.

STIGMUS SOLSKYI, Morawitz

1 ♀. Azazga. Roadside bank going towards the French cemetery between 9 and 10 a.m., 7. ix, 93. A. E. E.

DIODONTUS FRIESEI, Kohl

Specimens, all of which appear to me to belong to this species, were taken by Mr. Eaton or myself in one locality or another, in every month of the year except January, February, and October! Generally they occurred burrowing in sand or roadside banks; but Mr. Eaton records several on plants and flowering trees, viz. at Constantine on *Ecballium elaterium*; at Biskra visiting *Euphorbia Guyoniana*, *Suaeda vermiculata*, *Tamarix* (near the Barrage), and "a tree with blue flowers" in the Jardin by Fort St. Germain. (Since they prey on Aphids, it would not necessarily follow from their occurrence on a particular plant that they were attracted by its *flowers*.)

6 ♂♂. Alger and neighbourhood, 4. and 6. iv, 93. A. E. E.

1 ♂ and 4 ♀♀. Alger and neighbourhood, 18. iii–10. iv, 98. F. D. M.

11 ♂♂ and 1 ♀. Biskra and neighbourhood in v, 93, iii, 94, iii, 95, and iv, 97. A. E. E.

1 ♂ and 2 ♀♀. Bône, 28. xi, 93, 10. viii and 25. vii, 97. A. E. E.

1 ♀. Constantine, 30. ix, 93. A. E. E.

1 ♀. Tunis, 21. xii, 93. A. E. E.

2 ♀♀. Philippeville, 20. and 21. vi, 98. F. D. M.

DIODONTUS PUNICUS (Gribodo), André (?)

The specimens have the characters ascribed to his species by Gribodo, and two ♀♀ quite agreeing with them stand in Coll. Saunders as *punicus* received from Staudinger. Gribodo, however, speaks only of the ♂ as having

yellow mandibles, while in these insects the ♀ mandibles are also more or less yellow (in some specimens very distinctly, in others somewhat obscurely). Notwithstanding, I feel sure they are Gribodo's species.

The ♂♂ seem to me identical with that described by Saunders in Ent. Mo. Mag., 1904, p. 202, under the name *gracilipes* (vide his account of the intermediate metatarsi and the antennae—the serrated appearance of the latter beneath is caused partly by a slight excavation of the two penultimate joints!).

The species is larger than *minutus*—about the size of *tristis*; and, as in that species, the face of the ♀ is very broad in proportion to its length. The clypeus in this sex is widely and arcuately emarginate, (the exterior angles of the emargination very prominent and tooth-like,) and has another curious character which might easily be overlooked. It bears several longish scattered projecting hairs, two of which—one on each side just above the "teeth"—are excessively long (though so thin as to be almost invisible except in certain lights) and project straight forward far beyond the others—they are actually almost as long as the scapes of the antennae! In both sexes the vertex and mesonotum show under the microscope a regular reticulate aciculation, and are also very closely punctured (hence the surface appears opaque).

Mr. Eaton records no plants as visited by this species. His examples seem to have been all taken on sand or roadside banks.

1 ♂. Tunis, 21. xii, 93. A. E. E.
1 ♂. Biskra, 17. iv, 94. A. E. E.
4 ♂♂. Bône, 29. ii to 23. v, 96. A. E. E.
1 ♀. Alger, 25. iii, 93. A. E. E.
1 ♀. Bône, 28. xi, 93. A. E. E.
2 ♂♂, 3 ♀♀. Alger, 16. iii to 21. iv, 98. F. D. M.

DIODONTUS AFER, n. sp.

This insect appears to me so very distinct from anything I can find described that I venture to bring it forward as new, though rather unwillingly, as it is a single specimen.

The head, thorax, propodeum, and first abdominal segment are all exceedingly shining, and contrast most strikingly with the remaining abdominal segments, which are absolutely dull.

♀. Nigra, tegulis, genubus pedum omnium, et tarsis anticis rufescentibus vel brunneis, tuberculis nigris. Corpus, abdomine post segmentum basale excepto, valde nitens, subtilissime sparse punctulatum. Vertex (non autem mesonotum) microscopice reticulato-aciculatus; scutellum, ut videtur, omnino laeve. Propodeum in medio triangulariter impressum, subobsolete strigosum, angulis lateralibus acutis ac quasi reflexis, sed haud vel vix dentiformibus. Caput antice visum fere rotundum (haud transversum). Antennarum articuli intermedii fere quadrati; articulus 3^tius^ fere duplo- (4^tus^ fere sesqui-) latitudine sua longior.

Long. circ. 6 mm.

1 ♀. Alger, 28. iii, 98. F. D. M.

DIODONTUS SCHMIEDEKNECHTII, Kohl

I think these insects must belong to Kohl's species described from the adjoining Province of Oran. They have all, however, black "Schulterbeulen" (tubercles) which the author says is unusual in *schmiedeknechtii*.

(They very much resemble *luperus*, but have, I think, a finer and more sparse puncturation; and, so far as I can ascertain, the range of that species does not extend far south of the Alps.)

1 ♀. Hussein Dey (near Alger), probably on *Reseda*, 4. iv, 93. A. E. E.

1 ♀. Hippône, on *Sedum caeruleum*, 16. v, 96. A. E. E.

2 ♂♂ and 1 ♀. Alger, 11. iv to 2. v, 98. F. D. M.

PASSALOECUS BREVICORNIS, Moraw.

The following specimens belong to the most brightly-coloured form of the species (called *d* in Kohl's latest tabulation of the Genus). The insect we know in this country as *P. insignis* is, according to Kohl, another form of the same species. On comparing British "*insignis*" with these Algerian insects, I find that the head and thorax in the latter are distinctly a little more shining and less closely punctured, and that in this respect they agree with some Swiss specimens in my collection given to me as *turionum*, Dahlb.—which latter is also, according to Kohl, synonymous with *brevicornis*.

The nomenclature of the *Passaloecus* spp. is a difficult subject, but has probably been cleared up as far as it is ever likely to be by the paper of Kohl above referred to

(*Zur Kenntnis der Hymenopterengattung Passaloecus Shuck.* Wien, 1905).

Mr. Eaton records that his specimen from Alger (which is ticketed as a ♀ but is certainly a ♂) was taken along with another "burrowing in sand." There must be some mistake, however, here, I think; for the other specimen, though superficially very like this, is a ♂ *Diodontus*; and, normally at least, *Passaloecus* nidificates in *wood* (posts, palings, etc.) and not, like *Diodontus*, in sand.

1 ♂. Alger, 6. iv, 93. A. E. E.
2 ♂♂. Bône, 14. v and 10. vi, 96. A. E. E.
5 ♂♂ and 1 ♀. Alger (all on 21. iv, 98). F. D. M.

Pemphredon shuckardi, Morawitz

1 ♂. Bône, 16. iii, 96. A. E. E.
1 ♀. Bône, 2. v, 96. A. E. E.
3 ♂♂, 1 ♀. Alger, 7. iii to 5. iv, 98. F. D. M.
1 ♀. Constantine, 17. v, 98. F. D. M.
1 ♂, 1 ♀. Philippeville, 20. and 21. vi, 98. F. D. M.

The specimens are mostly rather small. Some of my own have been determined by Herr Kohl as *shuckardi*, and I think they all belong pretty certainly to that species.

Sceliphron targionii (Car.) D. T.

6 ♂♂. Biskra, on *Ammi visnaga*, 15. and 21. v, 97. A. E. E.
7 ♂♂ and 2 ♀♀. Biskra, 21.–23. v, 98. F. D. M.

Sceliphron pensilis, Ltr.

2 ♂♂. Biskra, on *Ammi visnaga*, 30. v, 93 and 19. v, 97. A. E. E.
3 ♂♂, 1 ♀. Biskra, 4.–16. v, 98. F. D. M.

Sceliphron tubifex, Lep.

♂ 1. Kef Oum Taboul (neighbourhood of Lac Tonga). "A species common in La Calle and at Le Tarf." 16. vii, 96. A. E. E.

Genus Ammophila, Kirby

My descriptions of the novelties and chief rarities among Mr. Eaton's and my own captures in this genus were published in the Annals and Magazine of Natural History, Jan. 1900. Certain mistakes made by me in

that paper have since been put right in Herr Kohl's Monograph of the Genus (1907), and the nomenclature of the latter work is followed in the list of captures given below.

Ammophila (Psammophila) atrocyanea, Ev.

I described these mistakenly as a nov. sp. under the name *masinissa*.

2 ♂♂. Biskra, 29. iii and 3. iv, 97. A. E. E.
1 ♀. Biskra, 7. ii, 95. A. E. E.

Ammophila (Psammophila) gulussa, Morice

1 ♂. Biskra, 30. iii, 97. A. E. E. (The type-specimen.)

Mr. Eaton on the following day took a ♀, which I supposed to belong to the above male, and described under the same name. Herr Kohl, however, is of opinion that they belong to two species, and that the ♀ is identical with his *algira* (an Eremochares), under which name it is recorded below.

Ammophila (Psammophila) hirsuta, Scop.

Numerous specimens from Biskra in February, March and April of different years. A. E. E.

Ammophila (Psammophila) tydei, Guill.

4 ♂♂. Biskra, 25. iii and 8. v, 97. A. E. E.
2 ♀♀. Biskra, 1. iii, 95. and 25. iii, 97. A. E. E.
1 ♀. Biskra (Col de Sfa), on *Teucrium polium*, 2. vi, 93. A. E. E.

Ammophila (Psammophila) micipsa, Morice

2 ♀♀. Biskra, 7. and 24. iii, 97. A. E. E. (Co-types.)

One of these was presented to me by Mr. Saunders, and is in my collection.

Ammophila (Parapsammophila) monilicornis, Morice

5 ♂♂. Biskra, 2.–6. vi, 98. F. D. M.

One of these has 14 (!) joints to each antenna.

Ammophila (Eremochares) dives, Brullé

1 ♂. Biskra, "visits *Nitraria tridentata* and *Tamarix*," 25. iv, 97. A. E. E.
2 ♂♂ and 1 ♀. Biskra, on *Tamarix*, 28. iv, 97. A. E. E.

3 ♀ ♀. Biskra, on *Echinops spinosus*, 6.–8. v, 97. A. E. E.
♀ 1. Biskra, 21. v, 94. A. E. E.
5 ♂ ♂, 7 ♀ ♀. Biskra, 12. v to 9. vi, 98. F. D. M.

AMMOPHILA (EREMOCHARES) LUTEA, Tasch.

1 ♂, 4 ♀ ♀. Biskra, 30. iv–28. v, 98. F. D. M.

AMMOPHILA (EREMOCHARES) ALGIRA, Kohl

1 ♀. Biskra, "resting for the night on a *Ferula* leaf, simply standing," 31. iii, 97. A. E. E.

This, as stated above, was described by me as the ♀ of *gulussa*.

AMMOPHILA (COLOPTERA) JUDAEORUM, Kohl

4 ♂ ♂, 1 ♀. Biskra, 6.–30. v, 98. F. D. M.

AMMOPHILA GRACILLIMA, Tasch.

1 ♂. Biskra, 5. v, 97. A. E. E.

I described this as the ♂ of *producticollis* (infra), but Herr Kohl considers the ♂ to be *gracillima*, and not identical specifically with *producticollis* ♀.

AMMOPHILA HAIMATOSOMA, Kohl

1 ♂. Biskra, among *Tamarix*, 3. v, 97. A. E. E.
1 ♀. Biskra, "in the Jardin near Fort St. Germain," 2. vi, 93. A. E. E.

AMMOPHILA PRODUCTICOLLIS, Morice

1 ♀. Biskra, 16. iv, 94. A. E. E. (The type-specimen.)

AMMOPHILA ALBOTOMENTOSA, Morice

1 ♂. Biskra, 31. v, 98. F. D. M. (Type of ♂.)
1 ♀. Biskra, 26. iv, 97. A. E. E. (Type of ♀.)

AMMOPHILA QUADRATICOLLIS, Costa

2 ♂ ♂. Le Tarf, 17. vi, and La Calle (on sandhills), 15. vii, 96. A. E. E.
1 ♀. Bône, 4. viii, 97. A. E. E.

AMMOPHILA NASUTA, Lep.

2 ♂ ♂, 3 ♀ ♀. Alger, 27.–30. iv, 98. F. D. M.

Ammophila poecilocnemis, Morice

2 ♂ ♂. Biskra, "visits *Ferula vesceritensis*," 19. iii, 20. iii, and 5. iv, 95. A. E. E.

1 ♂, 2 ♀ ♀. Biskra, 29. iii–22. iv, 97. A. E. E.

(These specimens are co-types.)

Ammophila propinqua, Tasch.

1 ♂. Biskra, 29. iii, 97. A. E. E.

1 ♀. Biskra, 17. v, 97, on *Ammi visnaga*. A. E. E.

Ammophila heydenii, Dahlb.

1 ♂. Constantine, 30. v, 95. A. E. E.

1 ♀, Constantine, 16. vi, 98. F. D. M.

Sphex (Chlorion) xanthocerus, Kl.

1 ♀. Bône, on *Cynanchum acutum*, 18. viii, 97. A. E. E.

Sphex (Harpactopus) Eatoni, E. Saunders

2 ♂ ♂, 3 ♀ ♀. Biskra, on *Ammi visnaga*, 19.–30. v, 97. A. E. E.

1 ♂. Biskra, 4. vi, 98. F. D. M.

The above are co-types of the description in Trans. Ent. Soc. 1910, Part IV, and those in Coll. Saunders stand above a label "Eatoni E.S." In the author's last letter to me he expressed himself as still somewhat doubtful whether he should not after all list them as a form of *lugens*, Kohl, but mentioned the same points of distinction as are noticed in his published description.

Sphex (Harpactopus) Stschurowskyi, Rad., var. hyalinipennis, Kohl

1 ♂, 4 ♀ ♀. Biskra, on *Echinops spinosus*, 7. and 8. v, 97. A. E. E.

Sphex (Harpactopus) subfuscatus, Dahlb.

1 ♀. Biskra, on *Ammi visnaga*, 31. v, 93. A. E. E.

Sphex (Parasphex) viduatus, Christ.

1 ♂. Biskra, 28. v, 93. A. E. E.

4 ♀ ♀. Biskra, on *Echinops spinosus*, 6.–8. v. 97. A. E. E.

1 ♀. Biskra, on *Ammi visnaga*, 2. vi, 97. A. E. E.

2 ♂ ♂, 5 ♀ ♀. Biskra, 27. v–9. vi, 98. F. D. M.

Sphex (Parasphex) albisectus.

1 ♂. Bône, on *Euphorbia paralias*, 23. viii, 97. A. E. E.
1 ♀. Biskra, on *Mentha rotundifolia*, 10. viii, 97. A. E. E.
1 ♀. Biskra, 22. iv, 97. A. E. E.
1 ♀. Biskra, on *Atractylis serratuloides*, 11. v, 97. A. E. E.

Mr. Saunders has noted that the above ♀ ♀ "show the pale apices of the segments very slightly," but that he has "little doubt in referring them to this species, as they have only three teeth on the claws, and the ventral apex of the abdomen red."

Sphex (Calosphex) niveatus, Duf.

1 ♂. Biskra, on *Ammi visnaga*, 24. v, 97. A. E. E.
1 ♀. Biskra, 3. v, 97. A. E. E.

The ♀ is pinned together with a grasshopper (*Sphingonotus 8-fasciatus*) many times larger than itself, and Mr. Eaton has noted as follows:—"The grasshopper was struck by the wasp during flight, fell paralysed to the ground, and was being carried off when the wasp was caught."

Sphex (Calosphex) senilis, n. sp.

This insect is exceedingly like the last, but its silvery (or rather hoary) clothing appears decidedly thinner, and as all the specimens agree in this, and they were taken at different times and under different circumstances, I hardly think this is merely due to "rubbing."

The ♀ seems to me clearly distinct by the following characters:—

(1.) Pecten tarsale, antici pedis, et tarsorum omnium armatura spinosa *non alba sed evidenter nigricantia*.

(2.) Clypeus *haud planus*, sed in medio longitudinaliter ita elevatus ut tectiformis vel paene carinatus videatur. Apex eiusdem angulariter (*haud arcuatim*) subexcisus.

(3.) Scutellum in medio *multo minus profunde impressum*. (Hoc in *niveato* ita sulcatum est, ut bituberculatum dici possit; quod in *senili* videre nequeo.)

The measurements of petiole, tarsal joints, etc., seem to me a little different from those of *niveatus*, but the differences are so slight that I should hesitate to lay stress on this. As for the ♂ ♂, I can find no really satisfactory

characters to distinguish them, and it may be that some which I take to belong to the above ♀ ♀ are really ♂ ♂ of *niveatus*. But comparing them with Egyptian ♂ ♂ of *niveatus* determined by Herr Kohl, I notice that, like the ♀ ♀, they have certainly a thinner and less brilliant silvery pubescence, allowing the sculpture of the very slightly impressed scutellum and the transversely rugulose propodeum to be seen quite clearly, whereas in Egyptian *niveatus* the sculpture is wholly concealed. In the details of the alar neuration (form of 3rd cubital cell, position of recurrent nerves, etc.) they differ exceedingly, and this makes me doubt whether they may not be a mixture of two different species. But the ♀ ♀ must, I think, be distinct from *niveatus*; and they certainly are not *nigropectinatus*, in spite of their dusky pecten, having a far longer petiole and an altogether less brilliant appearance, to say nothing of their smaller size. Some of Mr. Eaton's specimens are darker than my own, but this, I think, is accidental—probably due to cyanide.

1 ♀. Biskra, on *Ammi visnaga*, 28. v, 94. A. E. E.

2 ♀. Biskra, visiting *Nitraria tridentata* and *Tamarix*, 25. and 28. iv, 97. A. E. E.

1 ♀. Biskra, on *Tamarix*, 29. iv, 97. A. E. E.

1 ♀. Biskra, on *Echinops spinosus*, 7. v 97. A. E. E.

4 ♂ ♂, 6 ♀ ♀. Biskra, 7. v to 9. vi, 98. F. D. M.

Sphex (Calosphex) nigropectinatus, Tasch.

1 ♀. Biskra, 6. vi, 98. F. D. M.

Sphex afer, Lep. (?)

2 ♂ ♂, 3 ♀ ♀. Biskra, on *Ammi visnaga*, 29. v, 94 and 15. v to 22. vi, 97. A. E. E.

7 ♂ ♂, 2 ♀ ♀. Biskra, on *Echinops spinosus*, 6–10. v, 97. A. E. E.

19 ♂ ♂, 3 ♀ ♀. Biskra. F. D. M.

The ♂ ♂ are all black; in the ♀ ♀, agreeably to Lepelletier's description, the abdomen is largely red. I find in them all the characters given by Lepelletier, and this, coupled with their habitat, and their enormous size (some quite 36 mm. long), makes me feel sure that they are the species he was describing. Mr. Saunders at one time called them *tristis*, Kohl, and the ♂ ♂ certainly agree with the description of that species. But the dimensions of

tristis ♀ are given as 23–26 mm. only; and the author does not mention any difference of colour between ♂ and ♀ *tristis*, but simply says of the species "Nigra, nonnunquam paullum fuscescens."

SPHEX FLAVIPENNIS, F.

1 ♀. Médéa, on *Daucus setifolius*, 2. viii, 94. A. E. E.
1 ♂. Biskra, 3. vi, 98. F. D. M.

SPHEX MAXILLOSUS, F.

Numerous ♂ ♂ and ♀ ♀ from Biskra, Tizi Ouzou, Hippône (on *Ammi visnaga*), Médéa (on *Mentha rotundifolia*)—April to August. A. E. E. and F. D. M.

CERCERIS BUPRESTICIDA, Duf.

The ♀ is coloured far more brightly than normal European specimens, having the whole face, collar, postscutellum, lateral areas of the propodeum and a pair of discal spots on the middle area, nearly the whole of segments 1, 3, 4, and 5, and a wide uninterrupted basal fascia on segm. 2 of the abdomen above bright yellow. The femora are not black, but only somewhat rufescent; and ventral segments 2 and 3 are also not black but obscurely red and marked with yellow. Still I can find no structural difference accompanying this unusual colouring. Clypeus, cordiform area, ventral segments, etc., are formed and sculptured exactly as in ordinary *bupresticida*; and the ♂ ♂, though more yellow than specimens from Tirol, Corfu, etc., are not very much so.

1 ♂. Le Tarf, on *Foeniculum vulgare*, 26. vii, 96. A. E. E.
1 ♂. Biskra, on *Zizyphus lotus*, 3. v, 95. A. E. E.
1 ♂ and 1 ♀. Biskra, 14. and 23. v, 98. F. D. M.

CERCERIS INSIGNIS, Kl. (?)

Klug described his sp. from the ♀ only, and almost entirely on colour-characters. The present identification can only be conjectural; but if the insects now to be recorded are not really *insignis*, they must at least be exceedingly near it. (I feel pretty sure that *tricolorata*, Spin., is a synonym of the same species. This was also described from a ♀ only.) As neither author sufficiently describes the structural characters to fix for certain the affinities of his species, and Schletterer has therefore been

obliged to omit both names from his Tables, and relegate the descriptions to an appendix, I will here give the characters which I find in the ♀♀ before me, and also those of the ♂♂ which I take to belong to them, the latter sex being hitherto (so far as I know) undescribed. I may add that these characters show that in structure, though not in colour, the species is allied very closely to *bupresticida*, but that it can hardly be actually identified with it.

♀. Nigra, thorace infra et in lateribus cum propodei areis omnibus, et abdominis petiolo (hoc latitudine sua paullo longiore) rubris; facies cum carina interantennali brevi; collare utrinque, post-scutellum (interdum), maculae duo vel fascia interrupta basalis abdominis segmenti 2^{di} (cujus fasciae etiam in ventris lateribus continuatio satis obsoleta indicatur), fascia lata antice emarginata segmenti 3^{tii}, et segmentum 5^{tum} fere totum superne, flava; pedes pallidi, femoribus (praeter genua) cum trochanteribus coxisque fuscis vel obscure rufis, tibiis intus macula elongata nigra ornatis.

Clypei haud elevati apex in angulos plus minusve dentiformes excurrit, et praeterea tuberculis binis subapicalibus instructus est. (Haec autem armatura paene "microscopica" appellari debet!) Segmenti ventralis 2^{di} basis simplex (haud elevata); segmenti ventralis penultimi in medio evidenter foveati apex recurvatur in medio, ibique ita excisus est ut paene bidentatus videatur (minus tamen acute quam in *bupresticida*). Propodei area media rubra (an semper?), disco laevi, et in medio haud canaliculata longitudinaliter, sed basi extrema brevissime et subtilissime longitudinaliter striolata.

♂. Feminae simillima, sed minor, minusque rufescens. Abdominis quidem segm. 1^{mum} semper (ut videtur) rubrum: sed thoracis (proprie dicti) nulla pars et propodei aut areae solum laterales, aut ne hae quidem, rufo-pictae. Flavedo ut in ♀; sed fascia abdominis tertia non segmentum 5^{tum} occupat sed 6^{tum}, et segmentum 2^{dum} ventrale paene totum (!) flavet.

Clypei margo apicalis denticulatus. Segmenti penultimi ventralis apex lateribus acute denticulatis. Propodei area media fere ut in femina, sed (in exemplaribus his omnibus) linea impressa longitudinali evidenter in medio divisa.

The following two ♀♀ may possibly belong to a different, or even to *two* different species, but I am more inclined to think their peculiarities "individual," or at most "varietal."

a. Thorax entirely (except the yellow collar, postscutellum and tegulae) and also the cordiform area of the propodeum black (not red!). Hind tibiae within immaculate. Yellow

band of abd. segm. 3 scarcely at all emarginate, but practically covering the whole segment: also the basal band on segm. 2 is not broken into two spots but entire. Head with two little oblique yellow streaks or spots between the ocellar region and the tempora. In this form the body above is punctured much less closely than in that previously described, and its surface conspicuously more shining. The apical teeth and tubercles of the clypeus seem also to be more strongly developed; when the mandibles are opened, it appears from certain points of view actually "sexdentate"!

1. ♀ Biskra, 6. vi, 98. F. D. M.

b. This agrees with the last-mentioned form in its shining and comparatively sparsely punctured surface, and (I think) as to clypeus-characters (but unluckily in Mr. Eaton's only specimen the mandibles are closed!). Its coloration is very peculiar. The thorax shows no red at all, not even on the sides of the propodeum. On the other hand the 2nd abd. segment is not black and yellow but entirely red like the first! The yellow bands on segm. 3 and 5 are deeply emarginated. The tibiae within are black-marked, and the head above is immaculate.

1. ♀ Biskra, 31. v, 97, on *Ammi visnaga*. A. E. E.

Except as stated, the characters of these two specimens agree with those of the ♀♀ described previously. Accordingly, whatever view be taken of their relation to *insignis*, they certainly belong to the same group with it, viz. that of *buprestícida*.

CERCERIS FISCHERI, Spin. (?)

Fischeri, like *tricolorata*, seems to be an insect of which nothing is known except from Spinola's description. From what he tells us it would seem that the two species differ very little in colour, but are certainly distinct by the structure of the front coxae in both sexes, those of *fischeri* having a remarkable spine-like (cuneiform?) production or dilatation outwards, while those of *tricolorata* are normal. He mentions, too, that in *fischeri* the cordiform area has a distinct impression bisecting it longitudinally, which is not the case with the other species.

Both these characters distinguish the two ♀♀ now to be considered from those referred above to *insignis*, of which, as has been said, I believe *tricolorata* to be a synonym,

i.e. they have the anterior coxae very strongly cuneiform (simple in *insignis* as in *buprestícida*) and the cordiform area is manifestly divided by a longitudinal impression. They are marked with yellow almost exactly as is the other species, and like it they have a ground-colour varying between red and black, but with the red considerably more extensive than in even the brightest specimens of *insignis*.

They differ, however, from *insignis* in certain important points of structure (not mentioned by Spinola) which show that they do not belong, as it does, to the group of *buprestícida* at all, but must be considered as nearly allied to *funerea*, Costa, though in colour, etc., they are exceedingly unlike that species. By Schletterer's Tables one might suppose them to be his *eugenia*, but from the description of that species it seems impossible that such should be the case. Even if it be so, unless I am wrong in referring them to Spinola's species, they must retain the name given to them by that author.

Three ♂♂ taken by Mr. Eaton appear to me certainly to belong to the present species. As *C. fischeri* in both sexes has always been somewhat of a mystery to hymenopterists, I will attempt a diagnosis of the characters which I find in the specimens before me.

♀. Clypei haud elevati pars apicalis (ut in *emarginata*, etc.) subtriangulariter impressa. Segmenti ventralis 2^{di} basis elevata. Segmenti penultimi apex late ac profunde emarginatus, angulis eiusdem lateralibus ita elevatis ut quasi dentiformes videantur (minus tamen acute quam in *C. funerea*).

Caput nigrum; facie cum carina brevi interantennali, mandibulis (apicibus exceptis nigris), antennarumque scapis flavis (flagellis harum fulvis). Pro- et mesothorax nigra plus minusve rubro-variegata; scutellum rubrum; collare utrimque, tegulae alarum, et postscutellum flava. Propodeum (aut totum, aut excepta area media nigra rubro-bimaculata,) cum metapleuris et abdominis maxima parte rubra. Huius segmentum 1^{mum} totum rubrum; segmenti 2^{di} dorsum macula magna basali flava, venter eiusdem (an semper ?) vestigiis quibusdam obsoletis fasciae apicalis flavae signatus: 3^{tium} annulo lato apicali completo (*i. e.* ventrem quoque complectente) flavo: 5^{tum} apice dorsali flavo. Bases segmentorum intermediorum superne in medio plus minusve late denigratae. Pedes flavi, coxis trochanteribus femoribusque rufescentibus, tibiis intus immaculatis.

Caput superne punctis densis subopacum; thorax vero et abdomen

superne punctis dispersis vel subdispersis nitidissima. Propodei area media, basi non aut vix striolata, sed in medio longitudinaliter impressa vel sulcata, disco eiusdem (etiamque partibus adjacentibus arearum lateralium satis late!) omnino impunctatis et laevibus. Ventris puncta crassa et valde inaequalia, partim confluentia, partim sparsa, partim fere obsoleta.

♂ (exceptis excipiendis) feminae simillimus. Paullo minus copiose rufescens, propodei area media tota nigra. Flavedo ut in ♀, sed 6ti quoque segmenti dorsum fere totum flavet. Forma gracilior—petiolus praesertim multo magis elongatus. Coxae anticae (ut in ♀) valde cuneiformes, flavae. Structura ventris cum ♀ congruens.

3 ♂♂. Biskra, on *Polygonum aviculare*, 30. vi, and on *Ammi visnaga*, 8. vii, 97. A. E. E.
1 ♀. Biskra, on *Ammi visnaga*, 24. v, 97. A. E. E.
1 ♀. Biskra, 18. v. 98. F. D. M.

Cerceris emarginata, Pz.

This species is so common in all Mediterranean countries that a complete list of localities, etc., seems hardly needed. Mr. Eaton took ♂♂ as early as March (at Biskra in '97), and as late as October (Azazga in '93). They occurred visiting many different plants, as *Antirrhinum ramosissimum* at Biskra, *Marrubium vulgare* at Constantine, *Eryngium triquetrum* at Médéa, *Ammi visnaga* at Biskra and Hippône. My own captures of it were all made at Biskra and most probably on *Ammi visnaga*.

15 ♂♂ and 5 ♀♀ at various dates and places. A. E. E. and F. D. M.

Cerceris straminea, Duf. (?)

A single ♂ taken by Mr. Eaton may possibly (?) belong to this species. It agrees with it at least (and with no other whose description is known to me) in being absolutely *without black* on the body except at the apices of the mandibles! There is, however, a slightly infuscated line behind each antenna running along the sides of the usual interantennal carina.

In structure the insect is practically a gigantic *emarginata* (quite 10 mm. long). Dufour's type was a ♀, and he gives no characters but of colour; so that the identification I have suggested is a mere conjecture, and very likely wrong! Mr. Eaton's specimen is entirely pale yellow (with the

thorax slightly more rufescent—perhaps only a result of death by cyanide).

1 ♂. Biskra, on *Ammi visnaga*. A. E. E.

CERCERIS DACICA, var. OPULENTA, var. nov.

The coloration of this form is utterly unlike that of normal *dacica*; but in structure I can find absolutely no difference, except that the puncturation of certain areas, and also the fine oblique striae on the "cordiform" area, seem to be slightly feebler and shallower. Schletterer describes a var. *magnifica* of his *dacica*, differing from the type in being much more copiously ornamented with yellow: but the specimens before me not only have all the yellow markings of var. *magnifica*, but many more: thus the tempora, scutellum, all the areas of the propodeum, and the 1st abdominal segment, are practically yellow in both sexes, the vertex is marked posteriorly in the ♂♂ with a large yellow spot and in the ♀♀ with a pair of obliquely converging streaks, the collar is entirely yellow, and so is the interantennal carina which, as in all forms of *dacica*, is very strongly developed and in the ♀ practically reaches right up to the anterior ocellus; finally, in the ♀ even the mesonotum is not entirely black but shows two discal and two lateral yellow streaks, such as occur in highly-coloured specimens of the related but very distinct and much smaller species *annexa*, Kohl. (Mr. Eaton's ♀ specimen is greatly disfigured by the effects of cyanide, and also seems to have been originally less highly coloured than any of my own; but even in it the mesonotum and cordiform area show markings which no doubt were yellow once, though now they are merely reddish and scarcely noticeable, having become almost as dark as the surfaces surrounding them.)

I should have referred these insects without hesitation to *caspica*, Morawitz, had not that author expressly distinguished his species from *dacica*, as lacking impressed punctures on the tegulae and at the base of the pygidial area. Such punctures are distinctly visible in the specimens before me, so that, if the character be reliable, they cannot be *caspica*. Otherwise, both in structure and colour, they agree closely with Morawitz's description of the brighter (and apparently the normal) forms of that species. I am much inclined to suspect that *dacica*, *caspica*, *magnifica* and *opulenta* will ultimately prove to

be local races of a single widely-distributed species, which extends from Algeria to North China. I may add that the few specimens which I have seen determined by competent authorities as "*caspica*, Morawitz," are all less highly coloured than my own of *opulenta*, and apparently also than the form which Morawitz originally described. (None of them, *e.g.*, have the cordiform area yellow!)

2 ♂♂ and 1 ♀. Biskra, on *Ammi visnaga*, 17. v. 97. A. E. E.

1 ♂. Biskra, on *Ammi visnaga*, 19. v, 97. A. E. E.

2 ♀♀. Biskra, 26. v, and 6. vi, 98. F. D. M.

1 ♀. (Label giving date and locality is lost; but no doubt it was taken at Biskra in v or vi, 98.) F. D. M.

On 20. v, 98 I took a single ♂ in many ways much resembling the above, but with vertex, scutellum and "cordiform area" black, tempora with only a small yellow spot behind each eye, collar only yellow at the sides, and puncturation of abdomen coarser and more rugose. (This perhaps may be a specimen of *dacica*, var. *magnifica*, Schlett.)

Cerceris lunata, Costa

4 ♂♂, 3 ♀♀. Biskra, on *Ammi visnaga*, 18. and 25. v, 93. A. E. E.

2 ♀♀. Hippône, on *Ammi visnaga*, 12. viii, 96. A. E. E.

1 ♂, 3 ♀♀. Médéa, on *Eryngium triquetrum*, 26. vi, and 11. vii, 93.

3 ♀♀. Biskra, 24.–27. v, and 11. vi, 98. F. D. M.

Cerceris pallidula, Morice

The single specimen taken perfectly agrees with my "type" from Egypt.

1 ♀. Biskra, 15. vi. 98. F. D. M.

Cerceris pruinosa, Morice

I described this species (perhaps rather rashly) in 1897 from a single ♀ taken near Cairo, and am glad to find my ideas as to its distinguishing characters confirmed by further captures of what is evidently the same insect at Biskra in both sexes. In all, Mr. Eaton and myself have taken there 3 ♂♂ and 4 ♀♀, the ♀♀ corresponding in all respects with my Egyptian "type," and the ♂♂ strongly resembling them both in colour and structure—

in fact the two sexes can scarcely be distinguished without counting the abd. segments or examining the clypeus!

C. pruinosa ♂ differs from the ♂ of *C. pallidula* in the shape of the collar, which is much less profoundly impressed or emarginate in the middle; the 3rd antennal joint looks about as long as the 2nd and 4th taken together, while in *pallidula* it is scarcely longer than the 4th alone. Its average size seems to be a trifle greater, and its general tint is just a shade deeper—a pale lemon-yellow, while *pallidula* is rather creamy than actually yellow. The silvery pilose covering of the face in all my *pruinosa* ♂ ♂ is more conspicuous than in *pallidula*, but I have not sufficient material to determine whether this character is constant, though it *appears* to me that in *pruinosa* the actual hairs are longer than in the other species.

Mr. Eaton's specimens were taken on *Ammi visnaga*, and so probably were my own. He notes that the eyes of the ♀ in life were "light yellowish green."

1 ♀. Biskra, on *Ammi visnaga*, 23. v, 97. A. E. E.
1 ♂. Biskra, on *Ammi visnaga*, 29. v, 97. A. E. E.
1 ♂. Biskra, 30. v. 98. F. D. M.
1 ♂ and 2 ♀ ♀. Biskra, 7. vi, 98. F. D. M.
1 ♀. Biskra, 9. vi, 98. F. D. M.

Cerceris annexa, Kohl

A species resembling the two last in many respects, but smaller and far more delicately punctured. It seems to be common at Biskra every year in May, as Mr. Eaton took it in that month of '93, '94, '95 and '97, and I found it abundant in the same month of '98. According to Mr. Eaton's notes it appears to frequent first *Zizyphus lotus* and then *Ammi visnaga*.

2 ♂ ♂. Biskra, on *Zizyphus lotus*, 30. iv and 3. v, 95. A. E. E.
1 ♂, 1 ♀. Biskra, on *Zizyphus lotus*, 10. and 14. v, 97. A. E. E.
2 ♂ ♂. Biskra, on *Ammi visnaga*, 17. v, 97. A. E. E.
2 ♀ ♀. Biskra, on *Ammi visnaga*, 29. v, 94. A. E. E.
1 ♀. Col de Sfa, near Biskra, 27. v, 93. A. E. E.
13 ♂ ♂. Biskra, 7. v to 9. vi, 98. F. D. M.
10 ♀ ♀. Biskra, 20. v to 9. vi, 98. F. D. M.

CERCERIS LUTEA, Tasch. (= *nilotica*, Schlett. !)

I have carefully compared my single (♂) specimen, both as to colour and structural details, with one from Egypt, and can find no difference whatever.

1 ♂. Biskra, 7. v, 98. F. D. M.

CERCERIS EATONI, n. sp.

Caput nigrum, facie cum carina interantennali, mandibulis (praeter apices nigros) fascia pone ocellos, macula (vel striga) pone utrumque oculum flavescentibus. Thorax niger; collari, tegulis, scutello, postscutello que flavescentibus; pleuris sternis et propodei areis lateralibus plus minusve (in ♀ opulentius) flavo-pictis. Pedes flavescentes, femoribus posticis (praeter genua) nigris. Abdominis segmenti 2^{di} fascia lata antice emarginata, 4^{ti} (interdum etiam 5^{ti}) basis nigra; reliqua pars abdominis flava vel flavescens, segmentorum ventralium discis plerumque concoloribus. (Hisce in exemplaribus omnibus flavedo nonnusquam in aurantiacum vel ferrugineum transit, forsitan post mortem insecti decolorata). Alarum apices subfusi.

Oculi divergentes sed leniter. Clypeus antice impressus, apice haud libero. Collare (propter impressionem transversam) postice marginatum videtur, angulis inferis prominulis non autem spinosis. Coxae anticae valde dilatatae acute cuneiformes. ♀ mesopleurae (desuper visae) latera in medio denticulo acuto armata. Propodei area media polita ac nitida, in medio sulco longitudinali divisa. Petiolus elongatus, marginibus lateralibus aequaliter convexis. Segmentum ventrale 2^{dum} patella, ut mihi videtur, basali instructum, sed valde minuta, semicirculari. ♂ corpus crasse punctatum, ♀ minus crasse sed tamen fortiter, inter puncta (♂ et ♀) evidenter nitidum.

Long. 6–9 mm.

This is evidently a very near ally of *albicincta*, Kl., but judging from Schletterer's diagnosis of that species, I scarcely think the two forms can be specifically identical. Schletterer expressly says that *albicincta* has no basal elevation of the 3rd (*i. e.* according to my reckoning the 2nd) ventral segment, but such an elevation seems to me certainly present in *eatoni*. Nor does he allude to the cuneiform production of the front coxae and the spine-like tooth on the ♀ mesopleura—characters which he would scarcely have overlooked had they existed in his *albipuncta* ♀. (The latter was *first* described by Schletterer, Klug's type being a ♂.)

It is certainly nothing else known to me. It is not *subimpressa*, nor *rubida*; and though several antiquated and altogether imperfect descriptions might be strained into more or less agreement with it as far as colour-characters are concerned, I think it is really useless to consider seriously to which of these it might with least improbability be referred; and believe that an erroneous identification of a species already described is likely to cause more trouble to future systematists, than the re-description of it under a new name, which can be "sunk," if necessary, hereafter as a synonym.

1 ♂. Biskra, on *Zizyphus lotus*, 30. iv, 95. A. E. E.

1 ♂, 1 ♀. Biskra, on *Zizyphus lotus*, 14. v, 97. A. E. E.

2 ♂ ♂. Biskra, on *Ammi visnaga*, 17. and 20. v, 97. A. E. E. (One of these a dwarfish specimen, hardly 6 mm. long!)

1 ♂. Biskra, "on the wing," 7. v, 97. A. E. E.

CERCERIS KOMAROVII, Rad.

This very remarkable species seems to be quite common at Biskra. The ♂, I believe, is still undescribed. As might be expected, it has *not* the dentate tempora of the ♀; but in colour and general appearance resembles it almost exactly, except that the yellow markings on its mesonotum are narrower than is usual in the ♀, which sometimes has them dilated to such an extent that practically the whole area appears yellow—much as in *lutea*.

I should describe it as follows—

♂. Structura maribus *priscae* et *capitonis* valde affinis. Color, ut in ♀, pallide citrinus; mandibulae apice et parce vertex nigro-maculata: mesonotum nigrum citrino 4-vittatum: Alae hyalinae, apicibus infumatis.

Clypeus haud dentatus, convexus, antice late deplanatus. Antennae apice subtruncato uncinatae; harum articulus ultimus incurvatus, basi subtus (cum parte apicali articuli penultimi) rotunde excavatus. Collare in medio impressum, lateribus callosis. Segmenta abdominis dorsalia 1–5 in medio, ante apices saltem, (nonnunquam a basibus ad apices,) lineis impressis vel foveolis plus minusve elongatis incisa. Segmentum 1^mum^ vix petioliforme, 2do non multo angustius. Segmentum ventrale 2^dum^ basi haud elevatum: 5^tum^ in medio a basi ad apicem semilunariter impressum, (are impressa pilis stratis curvis ita obtecta, ut credat aliquis segmentum ipsum profunde emarginatum esse:) 6^tum^ quinto haud dissimile, sed

impressione pilosa magis transversa; 7^{mum} pilis apice non fimbriato sed lateraliter fasciculato; 8^{rum} penicillis *quattuor* (!) ornatur, duobus in medio marginum lateralium (brevissimis), duobus apicalibus (tenuibus quidem sed longis). Metatarsus intermedius gracilis, curvatus, mox post basim ad apicem sensim dilatatus. Tempora subtus haud ut in femina dentata. Ocelli postici inter se multo magis quam ab oculis distant (!) Corpus, facies praesertim et segmentorum ventralium apices, pilis argenteis vestitum; his tamen, nisi sub certa lucis incidentia, vix conspicuis. Integumentum corporis (exceptis scutellis et areis quibusdam ventralibus) subopacum; propodei area media lateribus oblique striolatis et punctulis nonnullis obsoletis impressa nitore poene caret, areae eiusdem laterales cum dorso abdominis confertim sed haud profunde punctantur. Area pygidialis apice quam basi fere latior, certe haud angustior (!).

Long. circ. 13 mm.

Mr. Eaton notes that the eyes in this sp. are in life "light yellowish green."

2 ♂ ♂. Biskra, on *Zizyphus lotus*, 24. v, 94. A. E. E.
1 ♂. Biskra, on *Zizyphus lotus*, 22. v, 97. A. E. E.
2 ♂ ♂. Biskra, on *Ammi visnaga*, 25. v, 93. A. E. E.
1 ♂. Biskra, on *Ammi visnaga*, 21. v, 97. A. E. E.
3 ♀ ♀. Biskra, on *Ammi visnaga*, 23. v, 18 and 22 vi, 97. A. E. E.
5 ♂ ♂. } Biskra, 20. v to 9. vi, 98. F. D. M.
7 ♀ ♀. }

Cerceris capito, Lep.

1 ♂. Biskra, on *Tamarix*, 29. iv, 97. A. E. E.
5 ♂ ♂. Biskra, 17. v to 9 vi, 98. F. D. M.

Cerceris hartliebi, Schulz

This is probably the only recorded *Cerceris* which is practically black entirely—body, legs, and even wings! Certain parts, it is true, are obscurely rufescent, but its general appearance is of an insect uniformly black.

It was described first so lately as 1905 from a single ♀ taken in Tunisie (Sfax) by Rittmeister v. Hartlieb, and no corresponding ♂ form has as yet been recorded.

I must confess myself to be not quite convinced that it is anything more than a local melanic ♀ form of *capito*, with which species, until Dr. Schulz's description appeared, had intended to treat it as specifically identical. My

reasons were—(1) That, on comparing its structure and sculpture in detail with those of a typical *capito* ♀ from S. France, I could find no substantial difference except that the latter had certainly a larger head,—and the difference in this respect is not greater than that between two ♀ specimens from Egypt (determined for me by Herr Kohl) of the closely-allied species *prisca*, Schlett. Their punctuation seemed to me quite similar; and they agreed also as to the characters of clypeus, mandibles, petiole, cordiform and pygidial areas, ventral segments, mesopleural (tooth-like) tuberculations, etc., etc. (2) That ♂♂ of *capito* occurred in some numbers (and not accompanied by their normal ♀ ♀!) on the same flowers of *Ammi* with my *hartliebi* ♀♀; but neither then nor afterwards could I find any ♂♂ of similar (black) coloration, though I naturally tried hard to do so, for I knew, of course, that an entirely black *Cerceris* must be something out of the common and probably undescribed.

I feel, however, that it may be rash to unite forms superficially so distinct, without more conclusive evidence than the above, and therefore follow Dr. Schulz in treating *hartliebi* as a good species.

4 ♀ ♀. Biskra, 19. v to 22. vi, 98. F. D. M.

Cerceris nasuta, Lep.

9 ♂♂, 2 ♀ ♀. Biskra, on *Ammi visnaga*, 19. v to 22. vi, 97. A. E. E.

1 ♂, 1 ♀. Biskra, on *Ammi visnaga*, 24. v, 93. A. E. E.

15 ♂♂, 7 ♀ ♀. Biskra, v and vi, 98. F. D. M.

Cerceris bucculata, Costa

From Costa's figures I feel satisfied that this must be his species, though I have seen no other specimens of it. The clypeus is exactly as he represents it, very like that of *ferreri* (= *propinqua*, Cost.), but *much* broader than long. These Algerian examples, however, seem to have more yellow on the abdomen than Costa's type; segments 1, 2, 4 and 5 having very broad fasciae, which are scarcely at all emarginate basally.

2 ♀ ♀. Biskra, on *Tamarix*, 19. and 30. v, 97. A. E. E.

Cerceris arenaria, L.

2 ♂♂. Médéa, on *Eryngium triquetrum*, 29. vi, 93. A. E. E.

1 ♀. Woods near Médéa, on (?) *Daucus setifolius*, 8. viii, 93. A. E. E.

1 ♂. Bône ("border of estuary—near the railway works"). A. E. E.

I think these are all *arenaria*, but the ♀ and the Bône ♂ seem to have wider and less emarginate yellow bands (esp. on segments 1 and 2) than normal European specimens.

(I am not quite certain that Mr. Eaton's record of *Daucus* as the plant visited by the ♀ refers to the insect to which I have attached it, but that is how I understand his note on the subject.)

CERCERIS NITRARIAE, n. sp.

This is evidently one of those pale-yellowish species, very sparingly marked with black (chiefly on the vertex and mesonotum), and with somewhat silvery pilosity, which seem especially characteristic of the N. African desert-fauna. Unfortunately all the specimens before me seem to have had their original colour much altered by cyanide, and I have no means of ascertaining how far this circumstance is responsible for the varying combinations of different yellowish tints (cream-colour, fulvous orange, and even testaceous red) which their paler parts now exhibit. I think, however, that these parts were not even originally quite unicolorous—some being probably lacteous, and others distinctly lemon-yellow. Abandoning the attempt to distinguish these tints, the coloration of the insect may be described as "flavescens sparse nigro-maculata." The vertex is crossed by a wide black fascia which is produced in front (biramose) so as to embrace the insertions of the antennae. The mesothorax, the pleurae at least in part, and the shining "cordiform area" are black, and some at least of the abdominal segments (all in the ♂) are more or less widely black at their bases. As in most species the ♂ shows a greater extension of black not only on the abdomen but on the head and thorax than the ♀, *e. g.* in the latter the tempora are yellow or fulvous, but in the ♂ they are black as well as the vertex and only bear a small spot of yellow behind each eye. In both sexes the collar, tegulae, and postscutellum seem to be always yellow. The scutellum may be yellow, or merely spotted with that colour (or with red ?), or entirely black.

The following diagnosis indicates the chief structural characters which I notice in *nitrariae*. It will be seen that they agree to a surprising extent with those of a very differently-coloured species, viz. *luctuosa*, Costa. The latter, however, besides differing from *nitrariae* in colour, has a very much stronger and closer puncturation, as will be seen at once if the abdomens of the ♀ ♀ in the two species are looked at side by side.

♀. Clypeus apice in medio acute bidenticulato. Carina interantennalis usque ad ocellum anticum prolongata. Propodei area media laevis, nitidissima, impressione lineari longitudinaliter divisa. Petiolus transversus, cum sequentibus 4 segmentis ante apicem evidenter impressus vel sulcatus (longitudinaliter), area pygidialis subovalis, apice et basi angustatis, deinde subtruncatis, lateribus subdense fimbriatis. Segmentum ventrale 2^{dum} basi haud elevatum, penultimum (quantum video) simplex. Punctatura mediocriter fortis, nusquam rugosa, intervallis punctorum subnitidis; partim (*e. g.* in scutello) fere dispersa dici potest.

Collare lateribus gibbose elevatis in medio depressum, angulis inferis spiniformibus. Antennarum articuli 3 et 4 latitudine sua plusquam duplo longiores. Flavescens vel partim albescens, verticis fascia lata antice biramose producta nigra. Nigra sunt etiam—occiput (non autem tempora) mesonotum cum parte pleurarum, propodei area media (nonnunquam etiam areae laterales partim), et segmentorum abdominis dorsalium maculae basales subtriangulares (interdum obsolescentes).

♂ feminae simillimus, crassius punctatus, flavedine magis restricta. Caput postice nigrum, pone oculos flavo binotatum; thoracis latera tota (plerumque etiam propodeum totum) nigra; abdominis fasciae flavae angustiores quam in ♀. Antennarum articulus ultimus leniter curvatus, dein recte truncatus. Clypei margo apicalis evidenter dentatus.

Oculorum margines interni in utroque sexu fere paralleli. Alae hyalinae apicibus fuscis.

2 ♂ ♂, 1 ♀. Biskra, "visiting *Nitraria edentata*," 19. v, 97. A. E. E.

2 ♂ ♂, 2 ♀ ♀. Biskra, on *Ammi visnaga*, 15. v to 8 vii, 97. A. E. E.

CERCERIS QUADRIMACULATA, Duf.

1 ♂. Constantine, 16. vi, 94. A. E. E.

6 ♀ ♀. Constantine, 14.–18. vi, 98. F. D. M

CERCERIS TRISTIOR, n. sp.

This small dark species, of which I found ♀ ♀ only, in general appearance and coloration much resembles *quadrimaculata*, and occurred at the same place and time with that species. But, besides being very much smaller, it is at once distinguishable by its almost unsculptured "cordiform" area, and the shining surface of its head and thorax above, the punctures on which are comparatively small and sparse. The almost entirely black face with merely a small pale spot adjoining each eye (as in many *Prosopis* ♀ ♀) is a curious character, and appears in all my specimens.

♀. Nigra, nitida; macula in medio orbitae internae utriusque oculi, et segmentorum abdominalium 3^tii^ 5^ti^ que fasciis latis apicalibus (antice in medio emarginatis) flavis.

Antennae fulvescentes apicibus denigratis scapis flavis. Mandibulae breves (in medio marginis haud dentatae) fulvae apicibus nigris. Pedes cum tegulis alarum flavi vel plus minusve fulvescentes. Alae apicibus haud obscurioribus subfumatae, costa stigmate etc. brunneis.

Clypeus totus niger, forma simplici, sed valde tumidus (convexus). Segmenta ventralia omnino simplicia. Caput superne sparse, mesonotum cum scutello etiam sparsius punctatum; pleurae rugosae; propodei area media disco laevigato, lateribus subtilissime (fere microscopice!) striolatis; areae eiusdem laterales dense punctatae. Abdomen superne punctis mediocribus subnitidum, area pygidialis anguste subovalis, coriacea, plus minusve rufescens vel brunnescens.

Oculorum margines interni fere paralleli: ocelli inter se minus quam ab oculis distant.

Long. circ. 9 mm.

3 ♀ ♀. Constantine, 16. vi, 98. F. D. M.

CERCERIS QUADRICINCTA, Pz.

This is evidently an abundant species in Algeria, and must have, I should conjecture, more than one generation in the year. I have taken it as early as March (at Cherchell) and abundantly in April 1910 (in the Province of Oran), while Mr. Eaton's records of it extend from the middle of May to the 19th of September in various years. (It is rather curious that in '98 I do not seem to have met with it, but possibly I may have given away or mislaid my specimens.)

1 ♂. Near Azazga, on *Eryngium tricuspidatum*, 1. ix, 93. A. E. E.

1 ♂. Forest of Yakouren, on *Eryngium tricuspidatum*, 19. ix, 93. A. E. E.

1 ♂. Le Tarf, on *Foeniculum vulgare*, 26. vii, 96. A. E. E.

1 ♂. Biskra, on *Foeniculum vulgare*, 15. v, 97. A. E. E.

3 ♀♀. Biskra, on *Ammi visnaga*, 24. v and 3. vi, 93. A. E. E.

1 ♂. Bône, on *Tamarix* (?), 25. vii, 97. A. E. E.

1 ♀. Médéa, on *Eryngium triquetrum*, 27. vi, 93. A. E. E.

Cerceris laticincta, Lep.

This identification I owe to Herr Kohl.

My specimen is a very darkly-coloured insect, the body being entirely black except a small yellow spot above the base of the clypeus, a very broad orange fascia (covering the whole of the 2nd and 3rd abd. segments both dorsal and ventral!), and the tegulae, legs (except the coxae), and the base of the mandibles, which are also orange (but this colour on the mandibles is very obscure—perhaps darkened by cyanide?).

The constrictions between the abdominal segments appear to me slighter than is usual in *Cerceris*. The cordiform area is dull, somewhat coriaceously rugulose all over without distinct striations. The mesopleurae are strongly toothed or tuberculated in the middle as in *capito*, etc. The clypeus in my specimen has unfortunately been damaged (probably by a needle employed to open the mandibles), and I cannot describe its form in detail, but the apex appears to have been narrowly produced (porrect?) and perhaps incised in the middle (?). The eyes are divergent. The mandibles simple (*i. e.* untoothed within) and blunt at the apex. The surface of the body in general is rather shining, its puncturation neither very close nor coarse. The pygidial area is barrel-shaped, slightly narrowing to its apex, and coarsely rugulose. The broad petiole and the segments following are distinctly impressed before their apices in the middle. The length of the insect about 15 mm.

1 ♀. Biskra, 28. v, 98. F. D. M.

Cerceris schmiedeknechtii, Kohl

1 ♂, 2 ♀♀. Biskra, on *Ammi visnaga*, 18. v, 93. A. E. E.

1 ♂, 1 ♀. Biskra, on *Ammi visnaga*, 28. v, 94. A. E. E.

3 ♂♂, 4 ♀♀. Biskra, on *Ammi visnaga*, 15.–23. v, 97. A. E. E.

1 ♀. Médéa, on *Daucus carota*, 8. vii, 93. A. E. E.

11 ♂♂, 9 ♀♀. Biskra, 14. v–4. vi, 98. F. D. M.

The species is excessively like *specularis*, Costa, but has a much more closely-punctured abdomen; and the interrupted abdominal fasciae seem to be always narrower than in that species, which I have taken freely in Greece and Palestine but never in Algeria.

PHILANTHUS TRIANGULUM, F.

Abounds everywhere, so it is needless to quote every record. Mr. Eaton found it visiting *Matricaria* (Alger), *Eryngium triquetrum* (Médéa), *Ammi visnaga* (Hippône and Biskra), *Teucrium polium* (Biskra), *Senecio* (Bône). Near Médéa a specimen was found at an altitude of over 3200 feet.

Many ♂♂ and ♀♀, from May to September inclusive, A. E. E. and F. D. M.

PHILANTHUS VARIEGATUS, Spin.

Found by Mr. Eaton visiting *Nitraria tridentata*, *Tamarix*, *Zizyphus lotus*, and *Ammi visnaga*.

1 ♀. Biskra, 28. v, 94. A. E. E.

1 ♀. Biskra, 29. iv, 95. A. E. E.

2 ♂♂. Biskra, 11. and 24. v, 97. A. E. E.

4 ♀♀. Biskra, 30. iv–26. v, 97. A. E. E.

2 ♂♂. Alger, 11. iv, 98. F. D. M.

5 ♂♂, 10 ♀♀. Biskra, 16. v–12. vi, 98. F. D. M.

PHILANTHUS RUTILANS, Spin.

1 ♀. Biskra, 24. iv, 94. A. E. E.

PHILANTHUS KOMAROVII, Morawitz (?)

1 ♂. Biskra (on the sandhills), 5. v, 97. A. E. E.

PHILANTHUS MELLINIFORMIS, Sm.

This is not (as D.T. Cat. makes it) a synonym of *venustus*, Rossi, but = the species described by Herr Kohl under the name *andalusiacus*.

1 ♂. Forest of Yakouren, on *Eryngium tricuspidatum* at altitude of 2000 to 3000 feet, 3. ix, 93. A. E. E.

2 ♂♂. Bône, visiting *Euphorbia paralias*, 14. viii, 96. A. E. E.

1 ♂. Bône, "commonly basks on stems of *Juncus maritimus*," 4. viii, 97. A. E. E.

Philanthus (Philoponus) thérvi, Vach.

5 ♀♀. Biskra, on *Ammi visnaga*, 18. v, 93. A. E. E.
1 ♂. Biskra, 29. v, 94. A. E. E.
2 ♂♂. Biskra, 21. and 23. v, 97. A. E. E.
8 ♂♂ and 2 ♀♀. Biskra, 5. v–4. vi, 98. F. D. M.

Philanthus (Philoponus) sp. ?

1 ♀. Biskra, 28. v. 98. F. D. M.

This is probably "new," but I abstain from describing it as such on a single specimen. The abdomen bears lateral white spots on the basal segments, segment 1 is red, the other segments black. It is much more shining on the thorax (especially the prothorax in front, and the sides of the propodeum) than *thérvi*, the body seems unusually pilose, and the spines of the legs (pecten, etc.) particularly long.

It is not *dewitzi* (!), the only *Philoponus* (besides *thérvi*) with which I have had the opportunity of comparing it.

Astatus (or Astata ?), Latr.

I have hesitated a good deal as to my proper course in dealing with the records relating to this Genus. By some unlucky accident all save one of my own captures have escaped mention of any kind in Mr. Saunders's MS. list now lying before me. My determinations of these, therefore, have not his authority, and this I have thought it best to indicate by enclosing them between square brackets [ ]. But a greater difficulty is that on full consideration I find myself unable to agree with the conclusions to which (if I rightly understand his MS.) my friend had come, as to certain identifications of Mr. Eaton's insects; and yet I do not think I should be justified in silently ignoring those conclusions, and modifying the list he had prepared in accordance with my own notions. I shall therefore publish the list as he left it; and in cases where it seems necessary, shall record my dissent and the reasons for it between square brackets. As to the name of the Genus I should have preferred myself to acquiesce, as

v. Dalla Terre and most authors have done, in Latreille's emendation of his first proposed name, and written "Astata"; but this question I do not wish to argue; and, as I find "Astatus" employed throughout in the MS. list, it shall remain so.

ASTATUS BOÖPS, Spin.

1 ♂. Constantine, visiting *Thapsia garganica*, 17. v, 95. A. E. E.

1 ♀. Constantine, 17. vi, 98. F. D. M.

[My ♀ is, I have no doubt, *boöps*, as determined by Mr. Saunders. But it is a remarkably large specimen, and has exceedingly dark wings—quite as dark as in *fumipennis*, Saunders.]

ASTATUS MINOR, Kohl

1 ♂. Hippône, "eyes [in life] pitch brown, or rufo-piceous," 15, viii, 96. A. E. E.

1 ♂, 1 ♀. Le Tarf, "on *Foeniculum vulgare*," 24. vii, 96. A. E. E.

1 ♀. Biskra, "5–6.30 p.m," 11. v, 94. A. E. E.

1 ♀. Bône, "along the shore across the Seybouse," 3. ix, 96. A. E. E.

[I took a ♀ at Constantine 14. vi, 98, and 2 ♂♂ and 1 ♀ at Biskra 24. and 25. v, 98 (F. D. M.) which Mr. Saunders does not appear to have noticed when he revised the collections, but which seem to belong either to this species or the next. See below under *radialis*, Saunders.]

ASTATUS RADIALIS, Saunders

Described in Trans. Ent. Soc. 1910, Part. IV.

1 ♂, 3 ♀ ♀. Le Tarf, on *Foeniculum vulgare*, 24. and 26. vii, 96. A. E. E.

1 ♀. Bône, "along the shore across the Seybouse," 5. ix, 96. A. E. E.

1 ♀. Bône, "along the shore across the Seybouse," on *Euphorbia paralias*, 23. viii, 97. A. E. E.

[I cannot help feeling a doubt as to the association of the above ♂ with the ♀♀. The latter appear certainly unlike the ♀ ♀ called by Saunders *minor* which were taken in the same localities with them and (at Le Tarf) on the same plant. But except a slight and, as it seems to me, hardly specific difference in the truncation of the

radial cell I can find no reason to think that *all* the ♂♂ here recorded (after Saunders's MS.) as *minor* and *radialis* do not belong to the same species. Their agreement in antennal characters, degree of clouding in the wings, etc., outweighs (I think) the difference of neuration, which in *Astatus* spp. generally is often erratic. And if they be identical, I suspect they are the ♂♂ of Saunders's *minor*, rather than of his *radialis*. But further, I do not feel certain that the former species is really Kohl's *minor*, of which I possess several specimens named by the author. The ♂ antennae, to my eye, are not identical with those of *minor*, Kohl (det. ipse), the joints beneath being less convex and more simply so (not at all sinuate in the middle!). Also the ventral pilosity appears distinctly longer. They seem to me more to resemble the ♂ of a Spanish species kindly sent to me by Señor Mercet, under a name which I refrain from quoting as I am not sure that it is yet published.

As to *radialis* ♀, I feel pretty sure that it is really (or rather was when described) a "new" form. Whether it will prove to be more than a local variety of some species already described from other districts, is another question. Several of the characters which are commonly utilised in defining the species of this difficult Genus are, to my mind, likely to prove unreliable. Even such comparatively well-defined species as *boöps* and *stigma* are exceedingly variable, not only in colour-characters, but in neuration, size, and even sculpture; and many of the existing descriptions are based entirely on characters of this kind.]

Astatus laetus, Saunders

1 ♀. Biskra, on *Ammi visnaga*, 19. v, 97. A. E. E.

Astatus fumipennis, Saunders

1 ♀. Biskra, on *Ammi visnaga*, 25. v, 97. A. E. E.

The above two species are both described in Trans. Ent. Soc., *l. c.*

Notogonia nigrita, Lep.

1 ♂. Biskra, visiting *Moricandia arvensis*, 10. x, 97. A. E. E.

1 ♀. Hussein Dey (Alger), 4. iv, 93. A. E. E.

1 ♀. Biskra, "near the Barrage, on the neighbouring

hill, carrying off an Achetid from a stony slope." 22. iii, 97. A. E. E.

3 ♀♀. Biskra, 18. i, and 15. ii, 95; 12. iv, 97. A. E. E.
2♂♂, 1 ♀. Biskra, 4.–20. v, 98. F. D. M.
2♀♀. Alger, 19. and 21. iv, 98. F. D. M.

NOTOGONIA POMPILIFORMIS, Pz.

1 ♂, 1 ♀. Biskra, on *Ammi visnaga*, 18. and 23. v, 93. A. E. E.
1 ♀. Biskra, on *Moricandia arvensis*, 10. ii, 97. A. E. E.
1 ♂, 3 ♀♀. Biskra, 30. iii, and 22. iv, 97. A. E. E.
1 ♀. Bône, 30. vii, 97. A. E. E.
1 ♂, 1 ♀. Biskra, 12. and 14, v, 98. F. D. M.
2 ♀♀. Alger, 16. iii and 12. iv, 98. F. D. M.

NOTOGONIA SCULPTURATA, Kohl

5 ♀♀. Alger, 16. iii–4. iv, 98. F. D. M.
1 ♂. Biskra, 16. v, 98. F. D. M.

NOTOGONIA OPALIPENNIS, Kohl

1 ♀. Biskra, on *Ammi visnaga*, 24. v, 97. A. E. E.

TACHYTES SUPERBIENS, n. sp.

This is by far the largest Palaearctic *Tachytes* known to me. In size and general appearance it agrees with *T. monetaria*, Smith, an Indian species. But on comparing it with the "type" of the latter at South Kensington (a ♀) I find that *monetaria* has the eyes further apart on the vertex, differently-clouded wings (darkest in the costal region and near the stigma and with only a small area slightly infuscated near the apex, while *superbiens* has them perfectly hyaline except at the apex, where a very broad and dark band runs along the margin), very different pilosity on the thorax (simple erect griseous hairs all over it), and a differently-coloured abdomen (the base being black, while in *superbiens* it is entirely testaceous). Nor is it *velox*, Smith, with whose "type" I have also compared it. It is far larger, and altogether different in colour and general appearance. It seems almost incredible that so magnificent a Palaearctic species should not have been long ago detected and described; and this is probably the reason that Mr. Saunders, though marking it as a "new species" in his list, has apparently neither

named it, nor prepared a description of it. I imagine that he expected to find one, when he should be able to return home and consult books which he had not by him in the seaside lodgings where his last MSS. were composed. I have failed, however, to encounter such descriptions; and as a search through the collections of *Larridae* (European, African, and Asiatic) in the British Museum (South Kensington) has revealed no species much resembling the present—except, as aforesaid, *monetaria*, Sm.—I can only treat it as new.

What Smith calls the "beautiful tessellated appearance" of the golden-haired abdomen in *monetaria* is a striking character also in *superbiens*. The same phenomenon is described in greater detail by Lepelletier in his account of *T. illudens* (but that is generally supposed to be a *Liris*, and it cannot, at any rate, be the insect now under consideration). Really the *whole* abdomen is clothed with minute golden hairs, but these only become visible when they reflect the light at certain particular angles; and the result is that, when looked at from behind, the abdomen appears chequered (like a chessboard) with alternate squares of light and darkness, these squares shifting their position, and sometimes actually becoming reversed, when the point of view is altered.

Nigra, dense punctulata; abdomine, mandibulis in medio, pedumque apicibus testaceis; tegulis ochraceo-flavidis; alarum superiorum margine apicali late infuscato, basi ac disco hyalinis. Pedes robusti, spinosi. Metatarsi antici serie subaequali 6 spinarum armati, spinis his in ♀ testaceis, validis, rectis, in ♂ albidis, multo minoribus.

Oculi in vertice (praecipue in ♂) valde approximati. Distantia horum longitudini antenn. artic. 4^ti^ in ♀, 5^ti^ in ♂ subaequalis (certe non maior sed ut videtur aliquanto minor quam in *T. freygessneri*, Kohl). Neque antennae, neque clypeus notam ullam singularem praebent. Huius pars apicalis in ♀ nonnihil deplanatur vel imprimitur, margine (in medio) subproducto, sed lenissime.

♀. Caput, thorax cum propodeo, basisque segmenti abdominalis 1^mi^, pilis tenuibus albidis subhirta. Praeterea facies, tempora pone oculos, latera thoracis plus minusve, pedesque partim (*e. g.* femora quatuor anteriora subtus), itemque margo mesonoti totus (*i. e.* antice postice et in lateribus) et postscutellum (non autem scutellum) pilis stratis vel substratis argenteis pulcherrime resplendent. Abdomen pube aureo-sericea revera quidem totum conspersum, specie vero, secundum lucis incidentias varias, varie tessellatum; (parte pilositatis

nunc hac, nunc illa, modo apparente, modo oculos fallente). Area pygidialis pilis rufescenti-aureis vestita.

♂. Pilositas dispositione similis, sed pallidior; neque argenteo- (facie excepta) neque aureo- tam distincte ac conspicue quam in ♀ micans.

Long. 17 mm. (♂)–22 mm. (♀).

1 ♂, 1 ♀. Bône, on *Statice*, 30. vii, 97. A. E. E.

2 ♂♂, 1 ♀. Bône, visiting *Cynanchum acutum*, 17. 18., and 20. viii, 97. A. E. E.

Mr. Eaton has noted that in life the eyes of the ♀ are greenish, those of the ♂ "pitch-black."

TACHYTES MACULICORNIS, Saunders

Described in Trans. Ent. Soc. 1910., Part IV.

2 ♂♂, 1 ♀. Biskra, on *Ammi visnaga*, 24. and 28. v and 19. vi, 97. A. E. E.

5 ♂♂, 5 ♀♀. Biskra, 18. v to 4. vi, 98. F. D. M.

The ♀ taken by Mr. Eaton was *stylopised*.

TACHYTES AENEA, Saunders

Described in Trans. Ent. Soc., *l. c.*

2 ♂♂. Biskra, "near railway, kilom. 199," 25. iv, 97. A. E. E.

TACHYTES FREYGESSNERI, Kohl

3 ♂♂. Bône, "on sandy ground," 29. vii, 97. A. E. E.

2 ♀♀. Médéa, on *Daucus setifolius*, 30. vii and 2 viii, 93. A. E. E.

2 ♀♀. Biskra, on *Ammi visnaga*, 18. vi and 2. viii, 97. A. E. E.

"Eyes of ♂ dull green" . . . "eyes of ♀ green" (A. E. E. MS.).

TACHYTES BISKRENSIS, Saunders

Described in Trans. Ent. Soc., *l. c.*

1 ♂, 1 ♀. Biskra, on *Ammi visnaga*, 22. vi, 97. A. E. E.

(In the Coll. the ♂ is accidentally ticketed as a ♀.)

TACHYTES SIMILLIMA, Kohl

3 ♂♂, 4 ♀♀. Biskra. "Eyes caesious, visits *Zizyphus lotus*," 25. iv, 97. A. E. E.

6 ♂♂, 5 ♀♀. Biskra, 9. v–11. vi, 98. F. D. M.

Tachytes tricolor, F.

1 ♂. Biskra, "visiting *Amberboa lippii*; eyes light greenish or light yellowish-green," 11. iv, 95. A. E. E.

1 ♂. Le Tarf, in the cornfields on *Ammi visnaga*, 27. vi, 96. A. E. E.

Tachytes obsoleta, Rossi

1 ♂. Biskra, 9. v, 98. F. D. M.

This specimen was determined by Herr Kohl.

Tachytes ambidens, Kohl (det. ipse !)

1 ♀. Biskra, 26. v, 98. F. D. M.

Tachytes europaea, Kohl

2 ♂♂. Between Tizi Ouzou and Azazga, on *Mentha*: "eyes light sap-green," 13. vi, 93. A. E. E.

1 ♀. Médéa, on *Eryngium triquetrum*: "eyes black," 26. vi, 93. A. E. E.

Tachysphex syriacus, Kohl

Mr. Saunders in his MS. list calls this species "*heliopolites*, Morice." But I am satisfied that it is not the species described by me under that name from Egypt. It is far larger. The hairs of the face are silvery in the ♀, fuscous or even black in the ♂. (In *heliopolites* both sexes have the face white-haired.) The pygidial area of the ♀ is different both in shape and sculpture (*vide infra*—in *heliopolites* it is tectiform, shining, and very slightly striated, almost smooth except for a few large but ill-defined punctures). The ♂♂ quite agree with specimens from Egypt which were determined for me as *syriacus* by the author, and so I venture to call it. (In rubbed specimens only two bands of silvery hairs appear on the abdomen, and Kohl's original description gives this as a character of his species. But others in better condition show 3 or even 4 complete silvery bands in a good light. They are best seen by looking at the specimen from in front.)

As I am not aware that the ♀ has yet been described, I give a diagnosis of its characters.

♀ mari simillima. Nigra, abdomine concolore, albido-pilosa. Frontis, clypei, etc., pilositas argentea, non (ut in ♂) fusca vel nigra. Segmentorum abdominalium apices fasciis latis argenteis ornati, revera continuis, quamvis, postice visae, interruptae videan-

tur. Mandibulae basibus argenteo-pilosis, in medio cum parte pedum (tarsis, tibiarum apicibus, etc.) testaceae. Tegulae venaeque alarum lutescentes. Harum cellula cubitalis 2da superne angusta, 3^{tia} latior ; forma huius paene ut in *T. panzeri.*

Metatarsi antici spinis plurimis (12–13) longis sed tenuissimis pectinati. Oculi in vertice circiter antenn. articuli 3^{ti} longitudine (vel paullo minus) inter se distant. (Minus certe quam in *T. fluctuato.*) Area pygidialis opaca, plana, dense granulosa (vel reticulato-punctulata), punctis nonnullis maioribus subobsoletis conspersa.

Long. circ. 13 mm.

1 ♂. Médéa, on *Daucus setifolius*, "Eyes light egg-yellow," 8. viii, 93. A. E. E.

1 ♂, 1 ♀. La Calle, 4. and 19. vii, 96. A. E. E.

1 ♂. Le Tarf, "visiting heads of *Cynara cardunculus*, 23. vii, 96. A. E. E.

2 ♂♂, 1 ♀. Biskra, on *Ammi visnaga*, "Eyes of ♂ light yellowish green, of ♀ dull greenish," 20.–25. v, 97. A. E. E.

1 ♂. Bône, "Eyes bright yellow," 30. vii, 97. A. E. E.

3 ♂♂. Biskra, 20. and 30. v, 98. F. D. M.

TACHYSPHEX FLUCTUATUS, Gent.

1 ♂. Biskra, 28. iv, 95. A. E. E.

2 ♂♂. Biskra, on *Ammi visnaga*, "Eyes bright yellow or greenish yellow, according to the point of view," 22. vi, 97. A. E. E.

1 ♂. Bône, on *Euphorbia paralias*, 5. viii, 96. A. E. E.

1 ♂. Biskra, on *Ammi visnaga*, 18. vi, 97. A. E. E.

(A very large specimen with red legs and dull-red base to the abdomen. Mr. Saunders submitted it to Herr Kohl, who considered that it was a variety of *fluctuatus.*)

3 ♂♂. Biskra, 18.–25. v, 98. F. D. M.

So many specimens having occurred, it seems rather curious that all were ♂♂.

TACHYSPHEX FILICORNIS, Kohl

1 ♀. Hussein Dey, 4. iv, 93. A. E. E.

1 ♀. Alger, 18. iv, 93. A. E. E.

1 ♀. Biskra, 19. v, 98. F. D. M.

TACHYSPHEX MEDITERRANEUS, Kohl

1 ♀. Philippeville, 21. vi, 98. F. D. M.

Tachysphex nitidus, Spin.

1 ♂, 1 ♀. Biskra, on *Euphorbia guyoniana*, 1. ii, 95. A. E. E.

1 ♂. Médéa, on *Eryngium triquetrum*, 29. vi, 93. A. E. E.

5 ♂♂, 2 ♀♀. Biskra, 2. iii, 95 and 6.–21. iv, 97. A. E. E.

2 ♂♂, 1 ♀. Bône, 3. ix, 96 and 31. vii, 97. A. E. E.

8 ♂♂, 3 ♀♀. Alger, 29. iii–21. iv, 98. F. D. M.

5 ♂♂, 3 ♀♀. Biskra, 5.–20. v, 98. F. D. M.

(?) 1 ♂. Biskra (probably *nitidus*, but Mr. Saunders notes of it, "has the vertex rather more convex and narrower than in normal specimens"), 20. v, 98. F. D. M.

Tachysphex eatoni, Saunders

Described in Trans. Ent. Soc. 1910, Part IV.

1 ♀. Biskra (road to Hammam es Salahin), 5. iv, 97. A. E. E.

Tachysphex, sp.? (probably *schmiedeknechti*, Kohl)

1 ♀. Biskra, 19. v, 98. F. D. M.

Tachysphex philippi, Saunders

Described in Trans. Ent. Soc. 1910, Part IV.

1 ♀. Philippeville, 21. vi, 98. F. D. M.

Tachysphex costae, Kohl

1 ♂. Biskra, on *Ammi visnaga*, "eyes yellow," 22. vi. 97. A. E. E.

Tachysphex julliani, Kohl

1 ♂, 2 ♀♀. Biskra 29. v, 98. F. D. M.

Tachysphex lativalvis, Thoms. (Black variety.)

1 ♀. Bône, "visiting *Euphorbia paralias*. Eyes piceous," 2. viii, 97. A. E. E.

Tachysphex pygidialis, Kohl

3 ♂♂. Biskra, on *Ammi visnaga*, 25. v, 93 and 15.–24. v, 97. A. E. E.

4 ♂♂. Biskra, among *Tamarix*, etc., above the barrage, 10. and 11. iv, 97. A. E. E.

Of these specimens Mr. Eaton notes: "Eyes yellowish green. Basks on the sand with antennae porrect, and though common is hard to catch, because it very often

frequents spots at the borders of bushes and under the ends of their branches."

1 ♂. Bône, on *Euphorbia paralias*, 5. viii, 97. A. E. E.

1 ♀. Le Tarf, "visiting heads of *Cynara cardunculus*," 23. vii, 96. A. E. E.

1 ♀. Biskra, on *Zizyphus lotus*, 25. iv, 97. A. E. E.

2 ♀ ♀. Biskra, about *Nitraria tridentata*, 21. and 28. v, 97. A. E. E.

3 ♂ ♂. Constantine, 15. and 17. vi, 98. F. D. M.

1 ♂. Philippeville, 20. vi, 98. F. D. M.

9 ♂ ♂ and 3 ♀ ♀. Biskra, 4. v. to 30. vi, 98. F. D. M.

This is probably the commonest of all *Tachysphex* spp. in Algeria, occurring everywhere, and under all sorts of circumstances.

Tachysphex psilopus, Kohl

3 ♂ ♂. Biskra, "above the barrage. Eyes dull light yellowish green," 4.–18. iv, 97. A. E. E.

3 ♂ ♂. Biskra, 5. v and 1. vi, 98. F. D. M.

Tachysphex [eduardi], Saunders

Described in Trans. Ent. Soc. 1910, Part IV.

1 ♂. Biskra, on *Zizyphus lotus*, 30. iv, 95. A. E. E.

2 ♂ ♂. Biskra, "eyes light yellowish green," 22. iv, 97. A. E. E.

1 ♀. Bône, "visiting *Eryngium triquetrum*," 6. viii, 96. A. E. E.

Tachysphex pectinipes, L.

1 ♀. Constantine, 16. vi, 98. F. D. M.

It would seem that this extremely common European species is quite a rarity on the other side of the Mediterranean! (Kohl, however, mentions North Africa as one of its habitats, and this specimen was submitted to and its determination verified by him.)

Tachysphex gracilitarsis, Saunders

Described in Trans. Ent. Soc. 1910, Part IV.

16 ♀ ♀. Biskra, 30. v to 9. vi, 98. F. D. M.

Although the ♀ ♀ were so abundant, I do not seem to have taken any ♂ ♂, and I had very nearly the same experience in the same locality with the allied species *panzeri*. The ♀ ♀ are of course larger and more striking

insects than their partners ; and it may be that, finding them simply swarming on *Ammi visnaga*, I unconsciously limited my captures to what appeared the finest specimens. (Or, possibly, the ♂♂ of *gracilitarsis* were "over" at Biskra before I arrived, but this seems less likely.)

TACHYSPHEX PANZERI, Kohl

1 ♂, 1 ♀. Biskra, 18.–24. iv, 97. A. E. E.

1 ♂. Médéa, on *Centaurea nicaeensis* (or *Scabiosa maritima* ?), 26. vi, 93 A. E. E.

1 ♂. Aine Draham (Tunisie), 22. vi, 96. A. E. E.

2 ♀♀. Biskra, on *Ammi visnaga*, 24. v, 97. A. E. E.

1 ♀. Biskra, on *Nitraria tridentata*, 21. v, 97. A. E. E.

2 ♂♂, 1 ♀. Bône, on *Salsola kali*, 19. and 20. viii, 97. A. E. E.

2 ♂♂, 1 ♀. Bône, 30. vii, 97. A. E. E.

From Mr. Eaton's notes I gather that the eyes of the ♂♂ were generally bright or yellowish green ; those of the ♀♀ darker, bluish or sea-green (glaucous).

8 ♀♀. Biskra, 6. v–7. vi, 98. F. D. M.

1 ♀. Constantine, 15. vi, 98. F. D. M.

TACHYSPHEX PANZERI, var. ORANIENSIS

1 ♀. Biskra, on *Ammi visnaga*, 30. v, 97. A. E. E.

TACHYSPHEX PANZERI, var. DISCOLOR

1 ♂. Biskra, 21. iv, 97. A. E. E.

1 ♂. Biskra, 7. v, 98. F. D. M.

TACHYSPHEX VESTITUS, Kohl

1 ♂. Biskra ("Hammam es Salahin on the sandhills"), 5. v, 97. A. E. E.

1 ♀. Biskra, 20. v, 98. F. D. M.

Mr Saunders has a note in the margin of his list as follows :

"The ♂ specimen of this species was named for me by Kohl himself. The ♀ which I associate with it resembles the ♂ in the dense silvery (in some lights more or less golden) pubescence which so clothes the head, thorax and propodeum that the sculpture is invisible. The vertex between the eyes is about equal to the length of the 2nd joint of the flagellum. The abdomen (which is broadly banded with silvery pubescence), and the legs are entirely

clear testaceous. The front metatarsi with a comb of seven long pale spines, the two basal ones shorter than the others."

TACHYSPHEX PSAMMOBIUS, Kohl

1 ♀. Constantine, "visiting *Echium caeruleum*," 16, v. 95. A. E. E.

TACHYSPHEX CAPITALIS, Saunders

Described in Trans. Ent. Soc. 1910, Part IV.
1 ♀. Biskra, 9. vi, 98. F. D. M.

TACHYSPHEX PIAGETIOIDES, Saunders

Described in Trans. Ent. Soc. 1910, Part IV.
1 ♀. Biskra, 12. v, 98. F. D. M.

TACHYSPHEX, sp.?

3 ♂♂, probably belonging to one species, and undescribed; but without the other sex, and possessing as they do no striking characters, it seems impossible to deal with them satisfactorily.
Biskra, 6.–12. v, 98. F. D. M.

TACHYSPHEX, sp.?

A single ♂ with the antennae evidently deformed.
Biskra, 14. v, 98. F. D. M.

ANCISTROMMA EUROPAEA, Mercet

1 ♀. Azazga (at an altitude of 1600 feet), 22. ix, 93. A. E. E.

This species, and also the Genus to which it is referred, are very recent additions to the Palaearctic Fauna. Both were introduced along with a second species (*A. maligna*) by Señor Mercet in February 1910. Mr. Eaton's specimen was taken some years before the earliest capture yet recorded of a Palaearctic *Ancistromma*, and is also (I believe) the only one hitherto recorded as occurring elsewhere than in Spain. Previous to 1910 the genus was known only as North American; and it was first established (by W. J. Fox) in 1903—the same year in which Mr. Eaton made his capture! (Cf. Kohl *Die Gattungen der Sphegiden*, Genus 38.)

PROSOPIGASTRA MORICEI, Mercet

Described in *Boletin de la Real Soc. española de His. nat.*, July 1907, from one of the specimens here recorded. The species is so like *P. lacrior*, described by myself in 1897 from Egypt, that neither Mr. Saunders nor I had considered it distinct, and, in fact, I sent it to Señor Mercet as a "duplicate" of *lacrior*. In Mr. Saunders's MS. list it still bears the latter name, but I think he had not seen the specimens since the description of *moricei* was published. The ♂♂, both of *laevior* and *moricei*, are still unknown; the chief difference between the ♀♀ lies in the form and sculpture of the "area pygidialis" (*cide* figs. 2 and 3 in Mercet's Paper).

4 ♀♀. Constantine, 16.–18. vi, 98. F. D. M.

PROSOPIGASTRA INSIGNIS, Saunders

Described in Trans. Ent. Soc. 1910, Part IV.

The species, or at least the type-specimen here recorded, is quite startlingly larger than any of our other *Prosopigastra* spp.!

1 ♀. Biskra, 11. vi, 98. F. D. M.

GASTROSERICUS MORICEI, Saunders

Described in Trans. Ent. Soc., *l. c.*

1 ♀. Biskra, 7. vi, 98. F. D. M.

DINETUS SIMPLICIPES, Saund.

Described in Trans. Ent. Soc., *l. c.*

4 ♂♂. Bône, 4. vi, 96. A. E. E.

Mr. Eaton notes as to these specimens, "Eyes tinged towards the orbits in front and behind with brownish, this colour leaving the middle lateral space (from the jaw upwards) olive-greenish, and intersected subvertically by a movable dark streak that slants downwards towards the lower end of the posterior orbit."

1 ♂. Le Tarf, 17. vi, 96. (A. E. E.)

DINETUS DENTIPES, Saund.

Described in Trans. Ent. Soc., *l. c.*

3 ♂♂, 1 ♀. Biskra, 30. iv, 94. A. E. E.

"Agile and difficult to net. . . . They rest on the sand, with antennae porrect and close together. Often near

Cynodon dactylon, and beside hummocks of *Limoniastrum guyonianum*." (A. E. E. MSS.)

3 ♂♂. Biskra, 6. and 9. iv, 97. A. E. E.

LAPHYRAGOGUS PICTUS, Kohl

1 ♀. Biskra, on *Ammi visnaga*, 6. v, 98. F. D. M.

I think I took at least one other specimen, but gave it away very soon. The same species has occurred to me at Cairo, but only ♀♀. The ♂, if I mistake not, is still unknown.

PALARUS HUMERALIS, Duf.

2 ♂♂, 1 ♀. Médéa, on *Eryngium triquetrum*. "Eyes of ♂ reddish-brown," 27. vi and 10. vii, 93. A. E. E.

5 ♂♂, 4 ♀♀. Biskra, on *Ammi visnaga*, 19. v–22. vi, 97. A. E. E.

7 ♂♂, 11 ♀♀. Biskra, 6. v–9. vi, 98. F. D. M.

PALARUS LEPIDUS, Kl.

The synonymy of the smaller *Palarus* spp. is much confused, and Mr. Saunders appears to have had some doubt what to call these specimens.

They agree entirely with Egyptian insects in my collection which were determined for me by Herr Kohl as *lepidus*. I did not find this species in Algeria myself; probably I left before it had appeared.

1 ♂. Médéa, on *Eryngium triquetrum*, 29, vi, 93. A. E. E.
1 ♀. Médéa, on *Eryngium triquetrum*, 28. vi, 93. A. E. E.
1 ♀. Aine Kriar, 22. vi, 96. A. E. E.

PALARUS SP. ? (*laetus*, Kl., sec. E. Saunders)

Mr. Saunders considered this to be a ♀ of *laetus*, Kl., of which, according to Herr Kohl i. litt., *histrio*, Spin., is a synonym. As I only know ♂♂ of *laetus* (taken by myself in Egypt and determined by Kohl), I cannot say for certain that this is not its ♀; but I am more inclined to think that it belongs to the species next to be recorded whose ♂ was taken in the same locality (Biskra), and in general appearance agrees extremely well with it. (I believe that *laetus* is only recorded from Egypt, though it is quite likely that it may occur also in Algeria.) But it must be admitted that the present insect agrees perfectly with

Klug's description of *lactus* ♀, except that the antennae cannot, I should say, be called "fusco-annulatae."

1 ♀. Biskra, on *Ammi visnaga*. "Eyes bluish-ash," 8. vii, 97. A. E. E.

PALARUS DISPUTABILIS, n. sp.

♂. *P. laeto*, Kl., fere omnibus notis similis: sed forma segmenti ventralis 2^di^, pygidii et scutelli, certe (ut opinor) distinctus.

Antennae pedum que bases vix conspicue infuscatae. Scutellum totum flavum, magis transversum quam in *laeto*, forma trapezoidali, antice quam postice multo latius. Segmenti ventralis 2^di^ pars apicalis callose quidem assurgens, sed leniter ac sensim, haud (ut in *laeto*) a latere visa in formam tuberculi magni subquadrati elevata. Abdomen apice haud "tridentato," sed potius uni-mucronato (angulis lateralibus pygidii non dentiformibus, sed omnino obtusis vel rotundatis; apice medio solum in mucronem satis longum producto). Segmenta abd. dorsalia 1–5, quodque ante flavedinis suae apicem utrinque maculam minimam curvatam, vel potius impressionem, tenuem sed distinctam, plus minusve decoloratam, spiraculo haud dissimilem, exhibet: cuius rei in *P. laeto* ne vestigium quidem invenire potui.

Oculi (nunc quoque, hoc est post duodecim annos !) colore omnino alio atque in *laeto*; scilicet rufo-brunneo suffusi (in *laeto* potius virescentes).

Scapi antennarum antice flavi (in *laeto* obscuri).

Long. circ. 8 mm.

The above characters appear to me amply sufficient to distinguish *disputabilis* ♂ from *lactus* ♂. Unfortunately the most important of them relate to points of structure in which the sexes differ, and cannot therefore be used to ascertain their respective ♀ ♀.

Two of them at least, however, viz. (1) the feeble discoloured impressions at the side of each abdominal yellow fascia (looking like a row of spiracles down each side of the dorsum) and (2) the transverse trapezoidal form of the scutellum and its entirely yellow colour, appear in the ♀ just mentioned, and called by Mr. Saunders *lactus* ♀. On this ground, and also on account of its complete general resemblance to *disputabilis* ♂, and its occurrence in the same locality at a slightly later date in the season, I believe it to be the ♀ of the latter.

(I ought to say that in *lepidus* also, though not in *laetus*, I can see indications of spiracle-like impressions in the

yellow abdominal fasciae, but they are not nearly so noticeable as in the insects now under consideration.)

1 ♂. Biskra, 6. vi, 98. F. D. M.

(?. 1 ♀. Biskra, 8. vii, 97. A. E. E. *Vide* above.)

Nysson braueri, Handl.

1 ♂. Le Tarf, on *Foeniculum vulgare*, 26. vii, 96. A. E. E.

1 ♂, 2 ♀♀. Biskra, on *Ammi visnaga*, 23. v–19. vi, 97. A. E. E.

1 ♂. Biskra, 27. v, 98. F. D. M.

I cannot find any records of the capture of this insect since it was described by Handlirsch from a single ♂ (taken at Sétif, Province of Oran) in the Vienna Museum. My specimen was determined by Kohl.

The ♀ is therefore, I suppose, undescribed. As might be expected, its structural characters (like those of the ♂) connect it closely with *scalaris*. The antennae, however, and also the scutellum with the adjoining posterior corners of the mesonotum, and the apex of the pygidial area are fulvous or yellowish (not black); and the latter area appears somewhat more strongly and regularly punctured. The silvery tomentum, characteristic of many desert species, is very conspicuous in these insects. The carinated frontal tubercle seems to me to be quite identical in the two forms. In fact, I can see nothing except colour and pubescence-characters to distinguish them.

Nysson epeoliformis, var. ditior, var. nov.

I am not sure but that this form has as good a claim as *braueri* to be described as a distinct species. It differs from typical *epeoliformis* very much as *braueri* from *scalaris*. The antennae are not infuscated except at their extreme apices. The whole pronotum, nearly the whole of the mesopleurae, the whole scutellum and postscutellum, and a great part of the propodeal spines are yellow, and the abdomen is principally of that colour, none of the fasciae being interrupted, and only those of segments 2 and 3 being incised (triangularly) at their bases. Its puncturation and rugulosities (propodeal, etc.) appear weaker and shallower than in *epeoliformis* ♂♂ from Albania; but the difference is slight, and in all main points of structure it agrees with the latter so exactly that I cannot convince myself of its specific distinctness.

(In one specimen the 2nd and 3rd cubital nervures are *exactly* confluent on the radius, in the other they are separated by an exceedingly small interval—about equal to the thickness of the radius itself.) The quadridenticulate clypeus is exactly that of *epeoliformis*.

2 ♂ ♂. Biskra, 9. v, 98. F. D. M.

NYSSON, sp.?

1 ♀. Médéa, 29. vi, 93. A. E. E.
1 ♀. Bône, 10. vi, 96. A. E. E.
1 ♀. Philippeville, 20. v, 98. F. D. M.

This is perhaps undescribed, but I think it better not to give it a name, especially as I have a suspicion that it may be the other sex of a new Spanish ♂ kindly communicated to me by Señor Mercet. In size and colour it resembles *dimidiatus*, but is much more strongly punctured, the antennae (at least beneath) are distinctly pale, and the collar bears two transverse oval spots of yellow which are conspicuous and quite similar in all three specimens.

NYSSON ERUBESCENS, n. sp.

1 ♂. Biskra, 24. v, 93. A. E. E.
1 ♀. Biskra, 4. vi, 98. F. D. M.

This species, I think, must be new. In colour it seems very nearly, though not in every detail, to resemble *rufus*, Hdl., of which the author only knew the ♀. But in structure it appears to be altogether unlike that species, having a distinct though small tuberculation between the antennae, a different form of 2nd ventral segment, and a perfectly normal ♀ pygidial area.

Rufo-testaceus, argenteo sericans ac partim pilosus, capite et sternis nigris, propodeo (♂) et abdominis dorso (♂ et ♀) plus minusve nigricante vel nigro (in ♀ solum lateraliter). Flavent antennarum fulvescentium bases antice, mandibulae in medio, clypeus, pronoti fascia subinterrupta basalis, tegulae alarum, pedumque fulvescentium tibiae cum genubus externe. Segmentum abd. dorsale 1^mum^ macula magna utrinque flava, segmenta 2-4 fasciis angustis flavis ornata, his in ♀ vix, in ♂ latius interruptis. Spinularum propodealium apices albidi.

Tempora pone oculos satis longe distincte marginata. Frons inter antennas quasi in tuberculum elevata et plus minusve rufescens. Antennae in ♂ subclavatae articulo ultimo curvato ac truncato, penultimis 2 simul sumptis parum breviore. Segmentum ventrale

2^{dum} basi truncatum potius (sed obtuse) quam simpliciter rotundatum : segm. ventralia subapicalia fimbriis nullis. Pygidium ♂ bidentatum vel bispinosum, ♀ simplex (haud ut in *rufo* quasi-bidenticulatum). Collaris anguli apicales bene definiti, in ♀ etiam acuti.

Puncta corporis subcoriacei mediocriter densa ac crassa.

Alae anticae venae cubitales 2 et 3 in radio haud confluentes, sed inter se fere tantum distantes quantum cellulae 2^{dae} apex a radio. Area analis alae posticae paullo post originem cubiti terminata.

Long. circ. 6 mm.

ALYSON RATZBURGI, Dhlb.

2 ♂♂, 1 ♀. Constantine, visiting *Thapsia garganica* 17. and 18. v, 95. A. E. E.

DIDINEIS NIGRICANS, n. sp.

1 ♂. Biskra, 24. v, 98. F. D. M.

Species *D. crassicorni*, Hdl., statura parva, antennarumque articulis penultimis latitudine sua haud longioribus, similis et affinis. Differt tamen articulo harum ultimo simpliciter curvato et elongato (haud contorto) fere ut in *D. lunicorni* sed evidenter crassiore : item clypeo, orbitis oculorum, scapis antennarum, tegulis alarum, tuberculisque humeralibus flavedine omnino carentibus ; facie inferne non argenteo—sed potius pallide aureo—pubescente ; segmentis que abdominis basalibus haud distincte rufis, sed poene totis nigris, tantum marginibus ipsis valde obscure rufescentibus.

Clypeus evidenter tridentatus. Vertex politus, fere impunctatus. Thorax cum abdomine toto superne subtilissime punctatus, et inconspicue breviter pilosus. Puncta abd. segmenti 1^{mi} sparsa sed distincta, reliqui corporis densiora. Abdomen infra pilis longis sub-pilosum.

Long. 5 mm.

This ♂ seems clearly to stand nearer to *crassicornis* than to *lunicornis*, but to be in certain respects intermediate between them. It seems far too small to be the ♂ of either *wustnei* or *pannonica*, since Handlirsch puts the length of their ♀♀ at 9–10 mm. and 9 mm. respectively. These species are only known from the north part of the Balkan district (Dalmatia, Hungary), and it is perhaps not very likely that they should occur in Algeria.

It must certainly be a close ally of *crassicornis*, but the differences indicated above appear to me sufficient excuse for treating it as specifically distinct.

It differs from any *Didineis* yet described in not having

the base of the abdomen red, but whether this character is specific or individual must be decided by means of further captures.

Gorytes rhopalocerus, Hdl.

1 ♂. Biskra, on *Ammi visnaga*, 21. v, 97. A. E. E.

Gorytes saharae, Hdl.

1 ♂. Biskra, on *Deverra chlorantha*, 13. v, 97. A. E. E.
1 ♀. Biskra, on *Ammi visnaga*, 30. v, 97. A. E. E.

The ♂ I believe is undescribed. It is exceedingly like *rhopalocerus*, but differs from it (as does its ♀) in being considerably more strongly and deeply punctured and in having all the hind tarsi conspicuously annulated at their apices with black. (In *rhopalocerus* there is no black on any of them except the claw-joint!)

Mr. Saunders in his MS. alludes to these specimens, and also that which I call *rhopalocerus*, as "rufinodis?". But I feel sure they are to be separated and named as above (cf. Handlirsch's Supplement to his Monograph). *Rufinodis* is an *Eastern* form, and not (as yet) known except from the Araxes-valley in Armenia.

Gorytes gazagnairei, Hdl.

1 ♂. Sidi Ferruch (on coast to west of Alger), 8. v, 93. A. E. E.
1 ♂. Constantine, visiting *Thapsia garganica*, 18. v, 95. A. E. E.
1 ♂. Bône, on *Mentha rotundifolia*, 10. viii, 97. A. E. E.
1 ♀. Philippeville, 20. vi, 98. F. D. M.

Gorytes fairmairei, Hdl.

2 ♂♂. Constantine, visiting *Ferula communis*, 14.–22, v, 95. A. E. E.
1 ♂. Bône, on *Euphorbia helioscopia*, 4. v, 96. A. E. E.

I found this little-known species quite abundant in both sexes, always on *Ferula*, at Hammam-bou-hadjar (Province of Oran) in April 1910.

Gorytes pleuripunctatus, Costa

2 ♂♂. Constantine. "Both asleep, standing on all their legs, with wings half open, and chins rather tucked in, fully exposed—a few inches apart—on a leaf of

Athamantha sicula . . . in an old quarry," 31. v, 95. A. E. E.

1 ♂. Bône, 23. v, 96. A. E. E.

None of these males have the antennae simply black except the yellow scape (cf. Handlirsch Mon.), but quite fulvous beneath and nearly so above until the last 3 or 4 joints, which *are* black practically. (On this account Mr. Saunders's MS. queries them as "*pleuripunctatus*?". But I have similar ♂♂ determined by Kohl and Schmiedeknecht, and the character seems to vary indefinitely in different specimens.) In one specimen only the sides of the propodeum are marked with yellow, and this is the case also with an Oran ♂ in my collection.

GORYTES (HARPACTUS) LAEVIS, Latr., var. (?)

1 ♂, 1 ♀. Biskra, 13. and 16. iv, 97. A. E. E.

I give the name with a note of interrogation because I have reason to think that Mr. Saunders referred these specimens to *pulchellus*, Costa. Apart from descriptions the latter species is not known to me for certain. But I am quite convinced that the present insects are only a form (closely resembling in some points that described by Radoszkowsky under the name *morawitzi*) of the widely-distributed and variable species to which I here assign them.

The yellow markings are exactly as in normal *laevis*, except that the 1st abd. segment is immaculate. The vertex behind the eyes, the whole dorsal surface of the thorax, except the black middle area of the propodeum, and the base of the abdomen are red.

Having compared these insects with many specimens of *laevis* from other Mediterranean countries, I find no character of structure or sculpture on which to separate them. But they are rather small (circ. 5½ mm.) and differ from all my other specimens in having the hind tibiae and tarsi not fuscous but clear testaceous, segm. 1 entirely red, and segm. 2 mostly of that colour, but banded or spotted at its base with black, and with a yellowish-white apical fascia dilated at its sides exactly as in normal *laevis*.

(Handlirsch, perhaps on Shuckard's authority, makes *laevis* not only a common Palaearctic, but even a *British* insect. This, I think, is a mistake. But its range is certainly very wide. It has been taken by Saunders on

the coast of Brittany; by myself in Spain, South France, Greece, Anatolia, Syria, and Egypt; and it was found by Handlirsch himself in Algeria, though in a variety differing considerably from that here recorded. If the present form be thought to require a distinguishing name, I would suggest "*pyrrhobasis*, var. nov.")

Gorytes (Harpactus) delicatulus, n. sp.

A very small, brightly-variegated species; no doubt nearly allied to *laevis*, *pulchellus*, etc., and especially to the latter. The extent of red on the abdomen is unusual—it is not confined to the basal segments, in fact it occupies the discs at least of all the segments. Its white markings also are very copious—they occur on every segment but the last. The ocellar region and the middle of the mesonotum are black, but otherwise even on the head and thorax there is very little black except on the under-side. And the generally pale appearance of the insect is made paler still by the silvery pilosity which, as in other desert species, clothes it more or less densely all over. Unfortunately this pilosity conceals the fine sculpture (punctuation, rugulosity, etc.) of certain areas (especially the propodeum) so that any "characters" that may exist in it are made practically unavailable. I have looked in vain for any special peculiarity of a structural nature in these insects, but their general appearance seems unlike that of anything yet described. (In Mr. Saunders's MS. list they appear as "sp. ?".)

Caput antice lacteum fere totum, superne nigrum, postice (pone ocellos) dilute-brunnescens temporibus fusco-maculatis. Pictura facialis lactea vel albida fere usque ad ocellum anticum ascendit, parvoque intervallo excepto spatium inter oculos totum occupat. In thorace albida sunt vel pallide flava—pronotum paene totum, mesonoti areae laterales cum tegulis alarum et parte pleurarum, scutellum, postscutellum, et propodei maculae 2 magnae laterales. Abdomen usque ad apicem pallide-testaceum, segmentis nonnullis partim nigricantibus (sed parcissime!), apicibus omnium (excepto ultimo) albido-fasciatis, fasciis latis et, ut videtur, semper integris. Antennæ pallide fulvescentes, superne plus minusve infuscatae, basi antice albida. Pedes colore simili, fusco plus minusve distincte lineati vel maculati, tibiis tarsisque vel totis vel antice saltem albidis. Corpus argenteo-sericans pilosumque, ita ut sculptura integumenti non facile dignosci possit. Clypeus simplex, apice lenissime late emarginato.

Vertex fere planus (certe haud tumidus !). Ocelli utriusque postici distantia et ab ocello antico et ab oculo fere eadem (scilicet diametri sui longitudini subaequalis !). Antennae ♂ normales, articulis omnibus longioribus quam latioribus, forma fere simplici.

Long. 3½–5 mm.

1 ♂. Biskra, "Eyes sap green," 30. iv, 94. A. E. E.
1 ♂. 1 ♀, Biskra, 9. iv, 97. A. E. E.

KOHLIA COXALIS, Morice

3 ♂♂. Biskra, on *Ammi visnaga*. "Eyes glaucous or sea-green," 24. and 5[illegible]. v, 97. A. E. E.
3 ♂♂. Biskra, 31. v and 6. and 9. vi, 98. F. D. M.
2 ♀♀. Biskra, 3. and 9. vi, 98. F. D. M.

STIZUS TRIDENS, F. var. ?

The ♀♀ have the clypeus and labrum more or less largely marked with yellow, whereas Handlirsch says of *tridens* ♀, "Facies semper omnino nigra." Notwithstanding, I believe these insects belong to that species. Saunders in his MS. list refers them doubtfully to *cyanescens*, Rad. But with the latter as described by Handlirsch they agree neither in puncturation nor pilosity. Apart from the yellow ♀ clypeus, etc., they seem to me absolutely normal *tridens*; and I may say that I have a ♀ from Palestine, determined by Herr Kohl as *tridens*, in which though the labrum is black, and the clypeus mostly so, there is a small patch of yellow on the latter (towards the apex of its longitudinal diameter).

I do not know whether the ordinary form of *tridens* ♀ has been recorded from Algeria. There is none such among Mr. Eaton's captures, and I did not find the species there at all.

2 ♂♂. Bône, on *Euphorbia paralias*, "eyes dark greenish," 5. viii, 97. A. E. E.
2 ♂♂. Bône, "visiting Homopterous blight on *Tamarix*," 9. viii, 97. A. E. E.
5 ♀♀. Bône, on sandy ground, 6.viii, 96, 2. ix, 96, 26. vii, 97. A. E. E.
1 ♀. Médéa, on *Eryngium triquetrum*, 10. vii, 93. A. E. E.
5 ♀♀. Le Tarf, on *Foeniculum vulgare*, 24. and 27. vii. 96. A. E. E.
2 ♀♀. La Calle, burrowing in sand "near the water's edge," 4. and 15. vii, 96. A. E. E.
1 ♀. Biskra, visiting *Tamarix*, 21. iv, 97. A. E. E.

STIZUS ACANTHOMERUS, n. sp.

Tridenti, F., simillimus et affinis ; pictura simili, sed pallidiore (subvirescenti-lactea), et paullo ditiore. (Scutellum fascia magna continua vel interrupta, postscutellum fascia continua semper ornatum. Abdominis fasciae omnes continuæ, fascia segm. 1^mi^ postice haud emarginata.) ♂ antennis ut in *tridente* constructis, ventre inermi. ♀ facie semper flavo-picta.

A *tridente* propter notas sequentes certe distinctus—(*a*) Ocelli postici ab oculis *evidenter minus quam inter se* distant. (*b*) Antennarum insertiones a clipeo area frontalis oblonga *bene definita* (*latitudinis suae dimidio haud* (♂) *vel non multo* (♀) *brevior*) separat. (*c*) Femora postica ♂ subtus excavata in fine sulci huius apicali armantur (fere ut in *S. meridionali*) *spinula una erecta nigra*. (*d*) Corpus minus hirsutum, pilis brevioribus et, ut videtur, mollioribus plerumque minus erectis. Punctulatio thoracis concinnior, aequalis, subtilissima, densissima, *sine punctis maioribus conspicuis*. (*e*) ♀ praeter corporis flavedinem ditiorem distinguitur statim antennis pedibusque *nigredine omnino carentibus* (solum nonnusquam leniter rufescentibus). (*f*) ♂ tibia postica fortius incrassato-dilatata sed minus spinosa (spinulis saltem brevioribus).

6 ♂ ♂, 2 ♀ ♀. Biskra, on *Ammi visnaga*, 18.–30. v, 93. A. E. E.

3 ♂ ♂. Biskra, on *Deverra chlorantha*, 13. v, 97. A. E. E.

1 ♂. Biskra, on *Zizyphus lotus*, 14. v, 97. A. E. E.

3 ♂ ♂. Biskra, on *Ammi visnaga*, 19. and 21. v and 19. vi, 97. A. E. E.

8 ♂ ♂. Biskra, 18. v–4. vi, 98. F. D. M.

11 ♀ ♀. Biskra, 20. v–11. vi, 98. F. D. M.

STIZUS DISCOLOR, Handl.

1 ♀. Biskra on *Ammi visnaga*, 18. v, 93. A. E. E.

2 ♂ ♂, 3 ♀ ♀. Biskra, on *Ammi visnaga*, 24. v–22. vi, 97. A. E. E.

7 ♂ ♂, 5 ♀ ♀. Biskra, 30. v–9. vi, 98. F. D. M.

STIZUS MAYRI, Handl.

1 ♂, 1 ♀. Azazga, on *Mentha*, "altitude of about 1420 ft.," 13. vi, 93. A. E. E.

4 ♂ ♂. Le Tarf, "on sandy ground," 17. vi, 96. A. E. E.

The ♀ seems to be undescribed. Comparing it with *peregrinus* ♀ I find no distinguishing structural character whatever, and even the coloration is almost identical—

only the abdominal fasciae appear wider, through being much less widely and deeply bi-excised in front. (This makes the two sexes superficially more similar than in other related species (*peregrinus, gazagnairei*) where the ♂ is generally a more brightly-coloured insect than the ♀.)

(Mr. Saunders's MS. alludes to another ♀ "Near Médéa, alt. about 3180 ft., burrowing in sandy soil about 1 p.m. 15. vii, 93, A. E. E.," but I cannot find this specimen in his collection, and do not know what has become of it.)

STIZUS GAZAGNAIREI, Handl. (?)

1 ♀. Constantine, 15. vi, 98, F. D. M.

I am somewhat doubtful about this determination, partly because of the date of the capture, and partly because the specimen is a little (but only a very little) more highly coloured than any of a series of ♀ ♀ before me which are certainly *gazagnairei*, taken by myself with their males at Hamman Bou Hadjar (Province of Oran) in April, before any other *Stizus* had appeared. In this specimen the clypeus is entirely yellow, and the legs show no black markings between the extreme bases of the femora and the unguiculi, while in all the Oran ♀ ♀ the former has a black central spot at its base, and the latter vary considerably in the extent of their infuscation but are never quite immaculate. Still I do not know what else it can possibly be, and its abdominal fasciae are abbreviated at their sides, and that on segm. 5 reduced to a mere central spot, exactly as in normal *gazagnairei*. It seems not impossible that the brighter coloration of the Constantine specimen may be a consequence of its appearance at a later date, or to some climatic difference between East and West Algeria; but it is perhaps rash to theorise about a single specimen which may after all belong to some distinct but cognate species. Several forms of this Group and those near to it have their ♂ ♂ abundantly distinct, but their ♀ ♀ almost indeterminable when they occur in isolated specimens apart from the other sex; (cf. Handlirsch's Synoptic Tables of the ♀ ♀ *passim* !)

STIZUS ZIBANENSIS, n. sp.

In Mr. Saunders's MS. these specimens are listed as *meridionalis*, Costa, but that species is not otherwise represented in his collection, and though its description

suits them in the main point, viz. that the 3rd ♂ ventral segment bears a tooth, it appears to me that they have structural characters which distinguish them from the real *meridionalis*. Of the latter I have several specimens, but unfortunately ♂♂ only, from S. Italy (Taranto) and Corfu. All these, besides being darker insects, with narrower abdominal fasciae, than *zibanensis* and very much more black on the legs, differ from it in at least three points of structure, viz. the hind femora have a definite and fairly long ante-apical spine (in *zibanensis* there is only an extremely short black tooth—more like a minute tubercle than a spine!—), the hind tibiae are simple (in *zibanensis* they are somewhat paradoxically compressed and twisted slightly in the middle, so that in a particular point of view both their lateral outlines appear distinctly sinuated inwards between their bases and apices); and finally the 7th ventral segment is "inerme" (Handlirsch) in *meridionalis*, while in *zibanensis* its extreme apex forms a tooth-like projection, much as in *discolor*, which is distinctly visible when the insect is viewed in profile from either side.

Mr. Eaton was so fortunate as to capture a ♀ together with one of his ♂♂. It completely agrees with their rather bright coloration, and is therefore probably distinguishable "at sight" from *meridionali* ♀, which, according to Handlirsch, would seem to resemble its own ♂, and therefore to be darker than the specimen before me.

♂. Antennis fere ut in *meridionali* constructis; segmento ventrali 3^{tio} dentato (dente plerumque minore magisque incurvato, sed et forma et magnitudine variat!) 7^{mi} apice dentiformi, angustato ac reflexo. Femora postica ante apicem haud spinula setiformi, sed dente nigro vel tuberculo brevissimo instructa. Tibiae posticae in medio singulariter *compressae ac leniter quasi contortae*, propterea marginibus ambobus ut videtur *intus sinuatis*. Pictura opulentior quam in *meridionali*, fere omnino ut in *gazagnairei* ♂. Flava sunt—facies sub antennis tota: collaris margo posticus cum tuberculis humeralibus: tegulae alarum etiamque mesonoti margines his adiacentes: scutelli maculae 2 magnae triangulares: postscutellum totum: abdominis segmentorum 1–6 dorsalium fasciae apicales latae integrae (etiam in ventre plus minusve conspicue continuatae); fascia 1ma postice late ac leniter semel emarginata, reliquis bi-excisis ac propterea tri-lobatis. Fulva vel testacea—segmenti dorsalis 7^{mi} macula magna apicalis: antennae (superne leniter infuscatae): pedesque (exceptis coxis trochanteribus que nigris)

♀. Pictura mari simillima: sed facie supra clypeum, etiamque segmento abdom. ultimo fere usque ad apicem ipsum, nigris. Caput antice latius (minus rotundum) quam in *peregrino*, fere ut in *kotschyi* sec. Handl. in Monogr. VI, Tab. iii, fig. 2.

4 ♂♂, 1 ♀. Biskra, on *Zizyphus lotus*, 29. and 30. iv, 95. A. E. E.

3 ♂♂. Biskra, 7. and 20. v, 98. F. D. M.

STIZUS TRIDENTATUS, Fabr.

1 ♀. De Tarf, on *Foeniculum vulgare*, 24. vii, 96 A. E. E.

1 ♀. Aine Draham (Tunisie) on *Centaurea*, "altitude from about 2700 to 3300 ft.," 21. vii, 96. A. E. E.

1 ♂. Constantine, 15. vi, 98. F. D. M.

STIZUS MELANOPTERUS, Dhlb.

1 ♂. Biskra, on *Zizyphus lotus*, "visits also *Nitraria tridentata* and *Statice pruinosa*. Eyes red purple." 24. v, 94. A. E. E.

1 ♀. Biskra, on *Ammi visnaga*. "Eyes brown purple." 25. v, 93. A. E. E.

1 ♂, 4 ♀♀. Biskra, on *Ammi visnaga*, 30. iv, 95 and 21. v–5. vi, 97. A. E. E.

1 ♂. Biskra, 20. v, 98. F. D. M.

STIZUS CRASSICORNIS, Fabr.

1 ♂. Biskra, "near Railway kilom. 198." 17. v, 94. A. E. E.

7 ♂♂. Biskra, 14. v–1. vi, 98. F. D. M.

6 ♀♀. Biskra, 20. v–7. vi, 98. F. D. M.

STIZUS KLUGI, Smith

1 ♂, 2 ♀♀. Biskra, 20. and 26. v and 3. vi, 98. F. D. M.

The ♂ has the 2 apical segments and a streak at the apex of segm. 5 testaceous; the ♀♀ have only obscure indications of that colour on segm. 6.

STIZUS POECILOPTERUS, Handl. (= *fasciatus*, Kl., nec Fabr.)

1 ♂. Biskra, on *Ammi visnaga*, 22. vi, 97. A. E. E.

This is a remarkable and interesting capture. As the ♂ is unrecorded, and the ♀ known only from Ambukohl in

Ethiopia, Mr. Saunders's determination of it was inevitably conjectural; but the insect clearly belongs either to that, or to some nearly-related species as yet unknown at any rate to the Palaearctic Fauna, such as *calopteryx*, Handl. (from India). It may be desirable, therefore, to give some description of its main characters. (Its general appearance is quite that of a tropical, rather than of a Mediterranean insect.)

Comparing it with Handlirsch's Analytic Tables one arrives without hesitation at the dichotomy *calopteryx* or *poecilopterus*, but there hesitates because the former is called "Species orientalis," and the latter ("Species africana") has the propodeum *red*, while in this specimen the "triangular area" at least is *black!* Such a character, however, cannot be thought to be conclusive: and even if it holds in the ♀ ♀, the ♂ ♂ may differ.

The head is more or less like those of *melanopterus* and *tridentatus*, the eyes converging somewhat similarly, and the apex of the clypeus folded in at its sides, so as to embrace the labrum, as in those species. But the clypeus appears decidedly less elongate; and the eyes approach much nearer to the posterior ocelli—the interval being much less than that which separates the latter from the anterior ocellus, or from one another. The neuration is just as in the above species (1st cubital cell *very* narrow above, etc., etc.). The insect is entirely without yellow markings, and is black only in the neighbourhood of the ocelli, on the triangular area of the propodeum, and (more or less dilutely) on some of the dorsal abdominal segments. Its general colour varies between two reddish shades, one lighter, the other darker. The antennae are subclavate, the 3rd joint hardly as long as the two following together, the apical joint about as long as the 12th much curved and sharply truncate. The head round about the ocelli is rather tumid and glabrous; but below these swollen areas, the face is somewhat impressed, and covered with beautiful silvery flat-lying hairs. The convex clypeus is separated from the bases of the antennae by a subtriangular "tectiform" area (so raised centrally as to appear carinated). The pronotum is almost without sculpture; the mesonotum closely and rugosely punctured, the scutellum finely and sparsely so; the propodeum has much larger punctures, very sparse in the middle, but becoming dense and even rugose on the sides. Behind, the propodeum is not

rounded off, but ends in a very sharply-defined truncation the corners of which are angular or even tooth-like, depressed and then reflexed, with a curiously jagged or denticulate outline. The triangular area is large, well defined, and bisected by a shallow linear impression.

The colour of the wings is the most striking of all its characters. At their bases they are clear hyaline up to the points at which the veins begin to branch and form "cells." The *upper* wings only are clear along a part of their apical margin, viz. from the apex of the radial cell to that of the vein which André calls "nervure posterieure." The rest of their extent is occupied by a most conspicuous dark fascia, with a sharp, nearly straight, interior margin. It is umber-brown by transmitted light, but by reflected light exhibits a most beautiful blue and purple iridescence, which contrasts quite startlingly with the clear glassy basal areas adjoining it.

Stizus grandis, Lep.

1 ♂. Biskra, on *Ammi visnaga*, 15. vi, 97. A. E. E.
1 ♀. Biskra, on *Ammi visnaga*, 25. v, 97. A. E. E.

Stizus tricolor, Handl.

10 ♂♂. Biskra, 5. to 25. v, 98. F. D. M.
5 ♀♀. Biskra, 16. to 25. v, 98. F. D. M.

I have little doubt that I am correct in this identification. Most of the ♂♂ agree in every respect with Handlirsch's description of one of the two ♂♂ (from Syria and Cyprus) on which alone he based it, viz. that in which the yellow band on the 2nd abd. segment was entire. The rest are in all main characters exactly similar, but exhibit one or other of certain slight differences in colour which, I feel certain, are individual and not specific, *e.g.* the propodeum may show either more or less of yellow than in Handlirsch's types, and in one specimen is black entirely; the apical abd. segment also is narrowly streaked with black longitudinally in one specimen, more broadly so in another, and in two black altogether.

The ♀♀ were taken along with them, and evidently belong to them. All the specimens (♂♂ and ♀♀) have the basal segment of the abdomen distinctly red, and the yellow bands on the following segments uninterrupted and exceedingly broad. In the ♀♀ the yellow markings on

the propodeum invariably unite into an entire arcuate (or semicircular) band—this is the case also with one at least of the ♂♂—and the apex of the abdomen is invariably a little rufescent.

Having carefully considered all Handlirsch's descriptions of the species assigned by him to the *fasciatus*-group (*rufiventris*, *niloticus*, etc.), and examined in the light of them the structural characters (puncturation, ♂ antennae,) as well as the colour of the wings and body in these insects, I can find nothing to which they seem likely to belong except *tricolor*. Characters of the latter which are conspicuous in them are the rather strong yellow staining of the wings, the dark violaceous-brown cloud over their radial area, and the clear exterior and inferior margin; also the even thoracic puncturation, the *narrow posterior* and *broad anterior*, yellow edging round the eyes, and to judge from Handlirsch's figure (Plate II, 10) the form of the apical joints in the ♂ antenna.

I believe that the following specimens, which are all ♂♂, may safely be referred to the same species. Certainly they now look very different from it; but only, I believe, because their original coloration has been completely altered by the effects of cyanide. In all of them, the red and yellow markings of normal *tricolor* alike on thorax and abdomen are represented only by slightly-differing shades of sordid brownish orange. The *pattern*, however, of these markings seems to be the same as in *tricolor*; and, curiously, the yellow on the face (clypeus, etc.) is very little affected, though even here, occasionally, it inclines slightly to become rufescent.

3 ♂♂. Biskra, on *Ammi visnaga*, "eyes reddish purple-brown," 18. and 25. v, 93. A. E. E.

2 ♂♂. Biskra, on *Zizyphus lotus* and *Nitraria tridentata*, "Eyes purplish brown," 24. v, 94. A. E. E.

(One of these is very small and dark, with the basal abd. segment practically black, and the band on the second segment interrupted. But I think it is only an aberration.)

2 ♂♂. Biskra, on *Zizyphus lotus*, "Eyes brown," "Eyes brown agate," 29. and 30. iv, 95. A. E. E.

1 ♂. Biskra, on *Ammi visnaga*, 24. v, 97. A. E. E.

2 ♂♂. Biskra, on *Ammi visnaga*, "Eyes light red-purple," 25. v and 22. vi, 97. A. E. E.

5 ♂♂. Biskra, 14. to 24. v, 98. F. D. M.

(It is odd that the cyanide, while reddening the *yellow* tints, seems to have had exactly the opposite effect on the *red*—expelling it and leaving the surface yellowish! In certain lights, however, a slight difference in colour between the (originally) red and yellow areas can be recognised; though there is no longer such a positive and striking contrast between them as is apparent in fresh specimens.)

STIZUS HYALIPENNIS, Handl.

1 ♂. Biskra, 31. v, 98. F. D. M.
1 ♀. Biskra, 2. vi, 98. F. D. M.

The ♂ has unluckily lost both antennae, so I cannot appeal to their characters to support this identification. But the colour, and unclouded wings, seem sufficient evidence.

STIZUS MARTHAE, Handl.

1 ♂. Biskra, on *Zizyphus lotus*, 24. v, 94. A. E. E.
1 ♀. Biskra, on *Ammi visnaga*, "Eyes greenish, or glaucous," 30. v, 93. A. E. E.
2 ♀♀. Biskra, on *Ammi visnaga*, 17. and 30. v, 97. A. E. E.
3 ♂♂. Biskra, 28. and 31. v and 6. vi, 98. F. D. M.
6 ♀♀. Biskra, 14. v to 3. vi, 98. F. D. M.

STIZUS TUNETANUS, Costa

1 ♂. Biskra, 23. v, 98. F. D. M.

STIZUS ARENARUM, Handl.

1 ♂. Biskra, "about 8.30 a.m.," "Eyes olive-green," 3. vi, 93. A. E. E.
1 ♂. Biskra, on *Zizyphus lotus*, 29. iv, 95. A. E. E.
11 ♂♂. Biskra, 14. v to 6. vi, 98. F. D. M.
3 ♀♀. Biskra, 25. v and 6. and 9. vi. 98. F. D. M.

STIZUS RAPAX, Handl.

1 ♂. Biskra, on *Ammi visnaga*, "Eyes light yellowish green or olive-green," 28. v, 94. A. E. E.
1 ♀. Biskra, among *Tamarix* near the barrage. "Eyes very light yellowish olive-brown." 30. iv, 97. A. E. E.
6 ♂♂. Biskra, 12. v to 20. v, 98. F. D. M.

Stizus fuliginosus, Kl.

1 ♀. Biskra, on *Ammi visnaga*, 31. v, 93. A. E. E.
2 ♂♂, 4 ♀♀. Biskra, on *Ammi visnaga*, 28. v to 22. vi, 97. A. E. E.
2 ♂♂. Biskra, 23. v and 6. vi, 98. F. D. M.

The wings in one of Mr. Eaton's ♂♂ are discoloured in a very singular manner. The infuscation has vanished entirely *from the middle* of every "cellule," but remains persistent *at their edges*. Consequently every nerve and vein appears thickened and blurred; as though one should make a pen-and-ink sketch of the neuration, and dry it hastily with imperfectly absorbent blotting-paper! This seems to have happened before, and not after, the death of the insect.

Sphecius intermedius, Hdl.

1 ♂. Biskra, on *Ammi visnaga*, 29. v, 94. A. E. E.
1 ♀. Biskra, on *Ammi visnaga*, 26. v, 94. A. E. E.
1 ♀. Biskra, 20. v. 98. F. D. M.

My ♀ was determined long ago by Herr Kohl as probably the undescribed ♀ of *intermedius*. Mr. Eaton's ♀ agrees with it, and his ♂ answers to Handlirsch's description. (The *apical* sinuation of the last antennal joint below is so slight that it might easily be overlooked, and the joint supposed to be sinuated once only!)

This ♀—still, I believe, undescribed—is coloured just like the ♂, and has the upper wings similarly clouded along their upper margin (more narrowly and indefinitely than in *hemixanthopterus* described below). The antennae have their scapes flavous in front, black behind; the flagellum is fulvous simply at its base; but towards the apex the colour grows more and more dusky, and the apical and two penultimate joints are practically quite black. The orbits of the eyes are very narrowly yellow. The more apical yellow fasciae on the abdomen are scarcely visible in Mr. Eaton's dreadfully discoloured ♀, in my own they are bright and well defined, those on segments 1 and 2 are largely interrupted, that on segment 3 narrowly so, the rest continuous (though, in certain positions only, they *look* interrupted), those on segments 4 and 5 are bisinuate on their basal margins (but much less deeply so than in *S. luniger*), and that on segment 3 incloses a little

black spot. On the thorax the collar, tegulae, and humeral tubercles alone show any trace of yellow.

SPHECIUS HEMIXANTHOPTERUS, n. sp.

3 ♂♂ and 1 ♀. Biskra, 27. v–9. vi, 98. F. D. M.

This and the next species agree in most structural characters, and also in certain details of coloration which seem to be constant in both sexes, and which do not seem to characterise any of the species yet described from Palaearctic localities. The yellow fasciae of the abdomen above, which (as in *uljanini*, Rad.) are extremely wide and almost or quite continuous on all the segments, are ornamented with a series of little oval spots or specks (black in the ♂♂, reddish in the ♀♀) on segments 2–5. The spots stand out conspicuously in the middle of the yellow spaces surrounding them. On each segment there are two of them, one on each side. On segment 1 they are wanting, but instead—at the same distance from the sides of the segment—the basal margin of the yellow fasciae is interrupted by a little punctiform or linear incision, as though the blackness or redness at the extreme (declivous) base of the segment had just a little "overflowed" on to its yellow disc. The phenomenon is so similar in both species, that at first I did not doubt they were identical; but the characters given below make me certain that they should be distinguished. (Cf. the description following of *claripennis*, n. sp.)

The ♀ of *hemixanthopterus* is extraordinarily like that of *uljanini* as figured by Radoszkowsky, and redescribed from the type by Handlirsch; but the character just mentioned does not seem to occur in *uljanini*, and there are other differences which I shall note below. *Uljanini* ♂ is unknown.

Species in utroque sexu singularis alarum discis brunnea quadam flavedine infuscatis quae cellulam radialem, cubitalesque 1^{mam} et 2^{dam}—non autem 3^{tiam}!—occupat.

♂. Antennarum fulvescentium articuli 2 penultimi basisque ultimi subinfuscata : artic. ultimus in medio fortiter ut in *nigricorni* semel flexus (infra haud bisinuatus !). Metatarsi intermedii ut in *antennato* (non ut in *nigricorni*).

Pictura opulenta. Flava sunt facies tota sub antennis cum oculorum orbitis interioribus latis : mandibulae (exceptis apicibus nigris) : collaris margo posticus : mesonoti latera cum tegulis tuber-

culis que humeralibus: pedes que (exceptis coxarum basibus). Scutellum in exemplaribus hisce omnibus rufescit potius quam flavet: postscutellum omnino nigrum est. Segmenta abdominis dorsalia aut tota flava sunt, aut flavo-latissime fasciata, flavedine in medio non aut vix interrupta, sed in segmentis 1mo et 2do antice plus minusve emarginata vel excisa. Segmenti 1^{mi} basis declivis tota nigra, etiamque incisurae duo punctiformes in ipso margine fasciae segmenti huius flavae. Segmentorum 2–5 fasciae flavae unaquaeque utrinque ante apicem suum punctum quoddam vel guttam nigram subovalem transversam includit. Pilositas corporis albida.

♀. Mari similiter sed multo opulentius picta. Nigredo fere omnino deficit, vel in colorem rufum transit. Antennae usque ad apices testaceae (nusquam obscuratae) scapis antice flavis; facies tota flava. Vertex inter ocellos posticos rufescenti-flavo biguttatus. Occiput in medio et pars temporum pone oculos colore simili. Mesonotum lateribus basique in medio flavis, etiam in disco utrinque vitta lineari rufa ornatur. Flavent quoque collare totum, mesopleurae (mesosternum vero nigrum !), scutellum, postscutellum, propodei pars basalis, abdominisque fasciae (ut in ♂) latissimae, sed segmentorum 1 et 2 bases, itemque series supra descriptae macularum ovalium flavedine inclusarum in segmentis 2–5, rufae sunt (non nigrae).

Long. ♂ 15–17 mm., ♀ 19 mm.

Sphecius claripennis, n. sp.

4 ♂♂, 1 ♀. Biskra, all on *Ammi visnaga*, "eyes light yellowish green," 18. v to 18. vi, 97. A. E. E.

3 ♂♂, 1 ♀. Biskra, 28. v, 98. F. D. M.

6 ♂♂. Biskra, 25. v to 3. vi, 98. F. D. M.

The males are very like those of the last species, but seem to be on an average rather larger. They are easily separated by having entirely fulvous antennae, bright yellow (not reddish) scutellum,* and the bases of the abdominal segments more widely black, the yellow fasciae consequently being reduced so much as sometimes to encircle the black oval side-spots only behind, and laterally allowing them to become confluent with the blackness at the base. These mere colour-characters by themselves might seem unimportant, and those of the abdomen are subject to variation within certain limits—in fact in some

* Unless darkened by cyanide as in some of Mr. Eaton's specimens, in which case *the other yellow markings are reddened also.* In all mine the scutellum is distinctly yellow.

specimens all the black side-spots are surrounded with yellow entirely. But they are associated (in both sexes) with a character which I think more important, viz. in *claripennis* the wings are entirely unclouded, in *hemixanthopterus* always strongly clouded, and to exactly the same extent in all my specimens. The only ♀ among my ten captures is coloured precisely like the ♂♂, and therefore very differently from *hemixanthopterus* ♀. Mr. Eaton's ♀ was evidently similarly coloured in life, but has suffered much from cyanide. (The resemblance between these species and our commonest forms of *Vespa*, e. g. *vulgaris* and *germanica*, is really quite extraordinary, but of course entirely superficial.)

♂ antennarum flexione apicali et metatarsi intermedii structura *hemixanthoptero* affinis, illis vero ante apices haud infuscatis et articulis evidenter magis elongatis.

Pictura in ♂ et ♀ paene eadem. Flava sunt, facies sub antennis tota cum mandibularum parte basali et oculorum orbitis interioribus: collare, tegulae, tuberculi humerales, macula (haud magna) mesopleuralis, latera mesonoti, scutellum, striga transversa postscutelli, segmentum abdominis apicale totum, et reliquorum segmentorum fasciae fere ut in *hemixanthoptero* ♂ sed inter se nigredine basali segmentorum magis evidenter separatae. Fascia segm. 1^mi^ continua, 2^di^ distincte quamvis anguste (per vittam nigredinis) in medio interrupta, reliquorum incisae quidem plus minusve profunde sed tamen continuae. Segmentorum 2–5 fasciae flavae maculam unaquaeque utrinque nigram vel totam, vel saltem lateraliter posticeque, includunt. Pedes flavi, vel partim subrufescentes. Antennae in utroque sexu usque ad apicem testaceae, scapis flavo pictis. Caput postice, thoraxque infra nigra. Abdominis venter niger flavofasciatus, fasciis plus minusve angustatis atque interruptis, apice toto flavo.

Long. ♂ 15–20 mm., ♀ 22 mm.

SPHECIUS, sp. ?

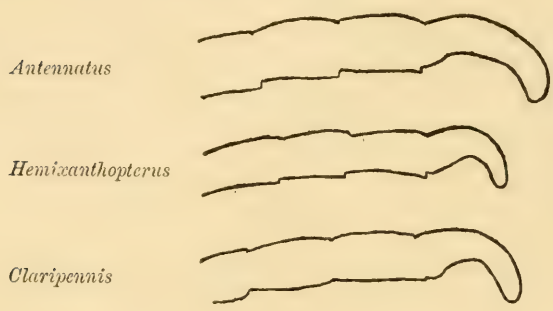
1 ♂. Biskra, 23. v, 98. F. D. M.

This specimen is no longer in my possession. I gave it away without keeping note of it, and the above record is quoted from the "Hymenopteren-Studien" of Dr. W. A. Schulz, who states that it has found its way into the Strassburg University Museum.

Dr. Schulz considers it to be a form of *antennatus*, Klug; but his very careful and detailed description of the speci-

men leads me to a different opinion. I think it must be a duplicate of the ♂♂ described above as *claripennis*, n. sp.

As Dr. Schulz points out, previous records of *antennatus* are limited to the *eastern* parts of the Palaearctic Region (from Turkestan to the Balkan peninsula, and nowhere on the African side of the Mediterranean). Again, from all that I can make out, *antennatus* (of which I possess only a single ♂ specimen* and the Saunders coll. another), is a species of very constant coloration, with far less of yellow either on thorax or abdomen than any of my *claripennis* specimens or than the insect described by Dr. Schulz. Handlirsch, after examining 20 specimens of *antennatus* from many localities, has satisfied himself that the long apical joint of the ♂ antenna with its inferior margin bisinuate is a constant character of *antennatus*; whereas in



claripennis and in the specimen now in question (*vide* Dr. Schulz's description) the apex of the antenna is constructed otherwise, viz. nearly as in *nigricomis*. The two *antennatus* ♂♂ before me quite answer in this respect, as well as in colour, to Handlirsch's statement; and in the absence of positive proof that the antennal character is variable, I should hesitate to discard the conclusions of so accurate and experienced a systematist as Handlirsch. In the present state of our knowledge, or rather ignorance, as to the possible variations of structural and other characters in *Sphecius*, and the precise distribution of nearly all its recorded forms, I think it safest to act on the hypothesis that two forms from widely-separated locali-

* This specimen, I ought to say, was taken by myself at Syracuse, and therefore at the extreme western limit of the recorded range of *antennatus*.

ties, with definable colour-differences, and obviously dissimilar apices to the ♂ antennae, are in all probability really distinct; and that, for the present at least, it is safest to call them by separate names.

The accompanying figures, or rather "silhouettes," of the apices of the ♂ antenna in *antennatus*, *hemixanthopterus*, and *claripennis* (placed as nearly as I can manage it in the same position and viewed from beneath) are obtained by photography from actual specimens in Saunders's and my own collections.

BEMBEX BARBARA, Hdl.

2 ♀♀. Near Médéa (alt. 2980-3000 ft.). 29. vi, 93, on *Eryngium triquetrum*, and 12. vii, 93, on *Centaurea calcitrapa*. A. E. E.

2 ♂♂, 6 ♀♀ (one of the latter a dwarf!). Constantine, 16. and 17. vi, 98. F. D. M.

BEMBEX GALACTINA, Duf.

1 ♂. Biskra, on *Ammi visnaga*, 25. v, 93 ("afternoon"). A. E. E.

10 ♂♂, 4 ♀♀. Biskra, 7. v to 9. vi, 98. F. D. M.

Handlirsch (Mon.) mentions this species as unknown to him. Mr. Saunders identified the A. E. E. ♂ from comparison with a specimen sent to him as "*galactina*" by M. Vachal. The ♂♂ by Handlirsch's Table work out as *pallida*, Rad., but they cannot be that species, as (apart from colour-differences) the intermediate femora have rather long, sharp and quite conspicuous "spinulae" on their inferior margin. Dufour's description, as far as it goes, suits them, and his type was an Algerian insect (from Ponteba). Mr. Eaton has a note, "Eyes subolivaceous, light markings of the thorax and abdomen ashy blue." (In the latter character, however, there seems to be considerable variation—some specimens having also a distinct tinge of greenish yellow—much as in *chlorotica*, which *galactina* superficially a good deal resembles.)

BEMBEX BRUNNERI, Hdl.

1 ♀. Biskra, on *Echinops spinosus*, 8. v, 97. A. E. E.

8 ♂♂, 4 ♀♀. Biskra, 16, v to 2. vi, 98. F. D. M.

Determined with the help of Egyptian specimens named for me by Handlirsch.

Bembex rostrata, F.

1 ♂, 1 ♀. Médéa, on *Eryngium triquetrum*, 29. vi, 93. A. E. E.

3 ♂♂, 3 ♀♀. Le Tarf, 23. vi, 96. A. E. E.

It will be seen that this common European species did not occur to either Mr. Eaton or myself at Biskra. (Its coloration is perhaps ill adapted to desert surroundings.)

Bembex mediterranea, Hdl.

Many ♂♂ of this common species were taken by Mr. Eaton and myself from April to August, but curiously only one ♀ (on *Zizyphus lotus*, at Biskra, 30. iv, 95. A. E. E.).

♂♂ occurred on *Scabiosa rotundifolia* at La Calle in July, on *Nitraria tridentata* at Biskra in May and April. Also at Hippône ("by the railway") and at Bône ("along the sands by the sea").

Bembex dahlbomi, Hdl.

1 ♂, 2 ♀♀. Biskra, on *Ammi visnaga*. "Eyes of ♂ sap-green, of ♀ greenish blue. Thorax with light yellow stripes on black ground . . . abdomen light ashy blue." 18 and 25. v, 93. A. E. E.

2 ♂♂. Biskra, 31. v, 93. A. E. E.

1 ♀. Between Tizi Ouzou and Azazga, 13. vi, 93. A. E. E.

2 ♂♂ and 1 ♀. Biskra, 7. v to 10. vi, 98. F. D. M.

Bembex radoszkowskyi, Hdl.

1 ♂. Biskra, on *Ammi visnaga*. "Eyes light bluish ash," 25. v, 93. A. E. E.

2 ♂♂. Biskra, 31. v, 98. F. D. M.

I have taken the same form exactly in Egypt (det. Kohl).

Bembex oculata, Latr.

Mr. Eaton took both sexes (dating from April to October) in various districts, and I (at Biskra) 7 ♀♀ (in May and June), but apparently no ♂♂.

The following plants are recorded by Mr. Eaton as visited:—*Eryngium triquetrum* and *Mentha rotundifolia* (Médéa), *Ammi visnaga* (Biskra and Hippône), *Zizyphus lotus* and *Echinops spinosus* (Biskra), *Scabiosa rotundifolia* (La Calle), *Inula viscosa* (Constantine).

Miscophus gallicus, Kohl

1 ♂. Médéa, 27. vi, 93. A. E. E.

Miscophus eatoni, Saunders

1 ♂, 1 ♀. Biskra ("near Kilom. 199"), 9. and 14. iii, 95. A. E. E.

Miscophus handlirschi, Kohl

1 ♀. Biskra, "by the river above the barrage amongst *Tamarix*," 21. iv, 97. A. E. E.
2 ♀♀. Biskra, 25. iv and 9. v, 97. A. E. E.

Solierella (Sylaon) compedita, Picc.

1 ♂. Biskra, "by Oued, Biskra, above the barrage amidst *Tamarix* and amongst *Cynodon dactylon*, on sandy ground loose on the surface," 16. v, 97. A. E. E.
(?) 1 ♀. Biskra, 19. v, 98. (A *Sylaon*; but perhaps another species?) F. D. M.

Trypoxylon scutatum, Chevr.

1 ♀. Biskra, on *Ammi visnaga*, 19. vi, 97. A. E. E.

Trypoxylon attenuatum, Smith

1 ♂. Bône, on *Chlorophora tinctoria*, 3. viii, 97. A. E. E.
1 ♂. Bône, on *Rubus discolor*, 13. viii, 97. A. E. E.
1 ♂. Constantine, 10. xi, 95. A. E. E.
2 ♂♂. Alger, 4. iv, 98. F. D. M.

Oxybelus lamellatus, Oliv. (= *arabs*, Lep.)

Mr. Saunders called this sp. "*arabs*, Lep," and no doubt it is so. But it is the species identified by Herr Kohl as *lamellatus*, and as that name has priority, I use it. The Algerian specimens are exactly like others from Egypt determined for me by Kohl, and one of my Biskra captures also bears his ticket "*lamellatus*, Oliv."

1 ♂. Biskra, "amongst *Tamarix*," 30. iv, 97. A. E. E.
1 ♀. Biskra, on *Ammi visnaga*, 28. v, 94. A. E. E.
1 ♂, 5 ♀♀. Hippône, on *Ammi visnaga*, 12.–15. viii, 96. A. E. E.
5 ♂♂, 1 ♀. Bône, "Common along the coast. . . . Fond of settling to bask on black or dark-coloured clothes." 14. ix, 96 and 25. vii, 97. A. E. E.

1 ♂. Médéa, 26, vi, 93. A. E. E.
1 ♂. Constantine, on *Atractylis gummifera*, 1. x, 93. A. E. E.
3 ♂♂. Biskra, 14., 16. and 30. v, 98. F. D. M.
2 ♀♀. Biskra, 27. v, 98. F. D. M.

OXYBELUS 14-NOTATUS, Jur.

2 ♂♂, 3 ♀♀. Biskra, amongst *Tamarix*, 7. iv–19. v, 97. A. E. E.
1 ♂, 1 ♀. Biskra, on *Ammi visnaga*, 13. v, 93. and 28. v, 94. A. E. E.
1 ♂, 5 ♀♀. Hippône, on *Ammi visnaga*, 12.–15. viii, 96. A. E. E.
1 ♂, 1 ♀. Le Tarf, on *Foeniculum vulgare*, 26. vii, 96. A. E. E.
3 ♂♂. Biskra, 14., 17. and 26. v, 98. F. D. M.
3 ♀♀. Biskra, 11., 14. and 16. v, 98. F. D. M.

OXYBELUS AFRICANUS, Kohl

1 ♂. Biskra, amongst *Tamarix*, 2. v, 97. A. E. E.
1 ♀. Biskra, on *Ammi visnaga*, 27. v, 97. A. E. E.
2 ♂♂. Biskra, 4. v, 98. F. D. M.
3 ♀♀. Biskra, 14. and 23. v, 98. F. D. M.

OXYBELUS PUGNAX, Oliv.

Some specimens are much darker than others, answering, as far as colour goes, to the descriptions usually given of *nigripes* (*e.g.* those of Gerstaecker and Marquet). But they have all the strong puncturation of *pugnax*, and I think all may safely be so called. (One of my captures was determined as *pugnax* by Kohl.)
1 ♀. Hippône, on *Ammi visnaga*, 10. viii, 96. A. E. E.
3 ♀♀. Biskra, among *Tamarix* (two very dark, one quite the reverse!), 4. iv and 1. v, 97. A. E. E.
4 ♂♂. Alger, 22.–30. iv, 98. F. D. M.
1 ♀. Biskra, 14. v, 98. F. D. M.

OXYBELUS MELANCHOLICUS, Chevr. (= *analis*, Gerst., nec Cress., sec. D. T.)

1 ♂. Biskra, 14. v, 98. F. D. M.
1 ♀. Alger (det. F. Kohl "*analis*, Gerst."), 30. iv, 98.

OXYBELUS BIPUNCTATUS, Oliv.

1 ♂. Biskra, amongst *Tamarix*, 29. iv, 97. A. E. E.

Oxybelus, n. sp. ?

2 ♂ ♂. Biskra, 4. v, 98. F. D. M.

These specimens were submitted to Herr Kohl soon after capture, and determined by him as "n. sp. near *elegantulus*." But as one has since lost its abdomen, and the other is evidently much discoloured by cyanide, I think it better not to attempt a description, and therefore leave the form unnamed.

Belomicrus obscurus, Kohl

1 ♀ (det. auctor !). Bône, visiting *Sedum caeruleum*, 10. vi, 96. A. E. E.

2 ♀ ♀. Biskra, 7. and 11. v, 98. F. D. M.

Belomicrus odontophorus, Kohl

1 ♂, 7 ♀ ♀. Biskra, "on sand amongst *Cynodon dactylon* and *Tamarix*," 15.–20. iv, 97. A. E. E.

1 ♂, 1 ♀ (det. auctor !). Biskra, 14. v, 98. F. D. M.

2 ♂ ♂, 1 ♀. Biskra, 14. v, 98. F. D. M.

2 ♂ ♂. Biskra, 20. v, 98. F. D. M.

Crabro (Brachymerus) 5-notatus, Jur. (= *trochantericus*, H. Sch.)

1 ♀. Azazga, 17. ix, 93. A. E. E.

2 ♀ ♀. Bône, 14. v and 1. vi, 96. A. E. E.

1 ♀. Hippône, 16. v, 96. A. E. E.

Crabro (Solenius) hypsae, de Stef.

1 ♀. Alger, on *Magydaris tomentosa*, 5. v, 93. A. E. E.

1 ♂, 1 ♀. Constantine, on *Thapsia garganica*, 19. v, 95. A. E. E.

5 ♀ ♀. Le Tarf, on *Foeniculum vulgare*, 24.–26. vii, 96. A. E. E.

1 ♀. Bône, on *Euphorbia paralias*, 31. vii, 96. A. E. E.

1 ♂, 1 ♀. Hippône, 15. viii, 96. A. E. E.

1 ♂, 1 ♀. Bône, on *Chlorophora tinctoria*, 3. and 12. viii, 97. A. E. E.

1 ♀. Constantine, 17. vi, 98. F. D. M.

Crabro (Solenius), sp. ?

Mr. Saunders has left this unnamed. It is like the last, but larger and much more pilose. In structure and sculpture it appears to me most like *meridionalis*, Costa,

but the abdomen in both sexes is practically unicolorous—black. (There is no *meridionalis* in Mr. Saunders's collection, and I believe it was unknown to him. My own specimens from Greece and Turkey in Asia have just been returned to me under that name by Herr Kohl, and comparing them with the present insects, I can find no difference except in colour. Hence I suspect, though I do not venture to say positively, that specifically they are identical.)

1 ♂, 1 ♀. Constantine, on *Ferula communis*, 17. and 22. v, 95. A. E. E.

Crabro (Thyreus) clypeatus, F.

4 ♂ ♂. Biskra, 16. and 25. v, 98. F. D. M.
4 ♀ ♀. Biskra, 10. and 23. v, 98. F. D. M.
1 ♂. Constantine, 16. vi, 98. F. D. M.

All these specimens have been determined for me by Herr Kohl. Mr. Eaton has taken what appears to me to be the same form exactly, but Mr. Saunders seems to have had a doubt on the subject, for his MS. has a note in pencil, "n. sp. nr. clypeatus."

The localities, etc., for these specimens are as follows—

1 ♂, 1 ♀. Biskra, on *Ammi visnaga*, 3. vi, 93 and 15. v, 97. A. E. E.

4 ♂ ♂, 4 ♀ ♀. Le Tarf, on *Foeniculum vulgare*, "sexes taken in cop.," 24. and 26. vii, 96. A. E. E.

Crabro (Crossocerus) elongatulus, Lep.

2 ♂ ♂, 2 ♀ ♀. Biskra, on *Euphorbia guyoniana*, 22. iii, 94. A. E. E.

1 ♂, 1 ♀. Constantine, "♂ on *Ecballium elaterium*, ♀ on *Ferula scabra*," 30. ix, 93. A. E. E.

1 ♀. Alger, 9. iii, 93. A. E. E.
1 ♀. Bône, 14. v, 96. A. E. E.
3 ♂ ♂. Alger, 4., 15. and 21. iv, 98. F. D. M.

Crabro (Lindenius) spilostomus, Kohl

1 ♀. Constantine, on *Oenanthe fistulosa*, 7. v, 95. A. E. E.

Crabro (Lindenius) hannibal, Kohl

1 ♂. Constantine, visiting *Thapsia garganica*, 17. v, 95. A. E. E.

2 ♀ ♀. Hippône, on *Ammi visnaga*, 10. and 15. viii, 96, A. E. E.

1 ♂, 2 ♀ ♀. Biskra, 14. v, 98. F. D. M.

Crabro (Lindenius), n. sp.

2 ♀ ♀. Biskra 8. and 20. iv, 97. A. E. E.

I do not name or describe these specimens, as they will be dealt with ere long in Herr Kohl's work now preparing on the *Crabronidae*.

VI. *Experiments in* 1909 *and* 1910 *upon the colour-relation between lepidopterous larvae and pupae and their surroundings.* By Elizabeth Bridges. Communicated by Prof. E. B. Poulton, D.Sc., M.A., F.R.S., etc.

[Read November 2nd, 1910.]

I. Experiments on the larva of *Uropteryx sambucaria.*
II. Transference experiments on the same.
III. Experiments on the pupa of the same.
IV. Note on some experiments on the larva of *Odontopera bidentata.*
V. Notes on the apparatus used.

I. *Experiments on the larva of* U. sambucaria.

The following experiments were undertaken with the object of finding out to what extent the close resemblance of certain lepidopterous larvae to their surroundings is due to the adaptive power of the individual. Prof. Poulton * has already shown that several species (notably *R. crataegata, A. betularia, O. bidentata, G. quercifolia,* etc.) do possess in a remarkable degree the power of assuming the colour of their surroundings, and in the summer of 1909 he kindly gave me some eggs of *Sambucaria*, and suggested that I should test this species in the same way. The results of the experiments show that it is one of the most sensitive hitherto investigated. I will briefly describe the experiments, before giving the details in tabular form.

As is well known, the larvae of most Geometers feed only at night, and spend the day motionless in a twig-like attitude on the woody part of the food-plant, which in many cases they closely resemble. Prof. Poulton found

* Trans. Ent. Soc. Lond., October 5, 1903, and December 1892; and "Colours of Animals," Lond., 1890, pp. 111, 112.

that the larvae are only influenced by the colour of the twigs on which they rest, or of those quite close to them, and in the experiments here recorded, all were kept alike in clear glass cases with white roof and floor, the only difference being in the colour of the few sticks placed among the leaves of the food-plant.

The eggs, about 130 in number, were all laid by the same moth, and hatched between August 14 and 16, 1909. They were introduced into the different environments within a few hours of hatching. The environments were as follows :—

A. Slips of white wood painted crimson with water-colour.

B. Black twigs of birch.

C. Slips of white wood. (The wood not a dead white, but the cream colour of common deal.)

D. White wood painted a pale green with water-colour.

E. Dead sticks of oak covered with grey lichen and green powdery alga.

The food-plant employed was elder (*Sambucus nigra*). The larvae proved to have only various shades of black, brown and cream at their command. On the pale green sticks (D), they became cream-coloured, on the red (A), a reddish-brown ; on the lichen-covered sticks (E) no lichen-like markings appeared as in the experiment on *bidentata* (see p. 144), but the larvae became a rich black of the same colour as the bark, and were most inconspicuous. Their sensitiveness showed itself rather in the swiftness and completeness with which they adapted themselves to the black and white environments (B and C). On the first day (August 21) that any were noticed on the black sticks, four became black on the back (they were distinctly darker than any of the other sets), and three days after this all but two were completely adapted, *i. e.* were indistinguishable in colour from the sticks. Those on the white sticks took some time to get rid of all traces of their dark markings: the first signs of the "bleached" appearance were not noticed until 12 days after they began to use the sticks (September 2): all but one were adapted in 21 days (on September 11). Notes were taken every three days with the exception of the first week. Those between September 29 and October 11 are omitted as no change was then recorded.

TABLE I.

DATE IN 1909.	A. PAINTED CRIMSON STICKS.	B. BLACK TWIGS OF BIRCH.	C. WHITE WOOD STICKS.	D. PAINTED GREEN STICKS.	E. DEAD STICKS OF OAK.
Aug. 14,15, and 16.	About 130 hatched and introduced in a few hours. (About 25 in each set.)				
Aug. 18.	All on leaves.				
Aug. 21.	4 on sticks. 4 on glass, 1 of these bluish. 13 on leaves, 5 of these bluish.	5 on sticks. 22 on leaves, 4 of these bluish black on back. 5 faintly bluish.	5 on sticks, 4 on glass, 13 on leaves (9 faintly bluish).	7 faintly bluish. All on leaves.	5 on sticks, 3 bluish. 1 on glass. 16 on leaves, 7 bluish.
Aug. 24.	All on leaves. 4 light brown on back, 10 dark bluish on back. 5 intermediate.	2 on sticks quite black on back: black marks on brown underneath. 26 on leaves the same. 2 more on leaves brown on back.	26 all on leaves, 7 light brown on back, and dark bluish as in A, 11 intermediate.	All on leaves. 2 pale brown, 14 dark, 1 intermediate bluish.	All on leaves. 4 light, 1 intermediate, 17 dark.
Aug. 27.	All on leaves. 17 dark form, 2 light. These and 2 dark ones rather shorter than the others.	6 on sticks, 20 on leaves, 2 on ground. All in 2nd stage but 1. All but this 1 light brown underneath with reddish black marks.	17 2nd stage, dark form on leaves. Underneath greenish, with light brown markings.	All on leaves. 1 on stick 2nd stage dark form, 1 rather browner underneath than the others. 15 2nd stage on leaves, usual dark form as C. 1 1st stage, lightest form.	19 2nd stage usual dark form (6 rather browner underneath), 2 smaller (1st stage?) dark form.

	form, shiny reddish black on back, like B, but not quite so dark especially underneath, 19 counted. All 2nd stage.	ground. Colour as before, but distinctly shiny on back like sticks. All 2nd stage.	leaves, 1 on ground. Colour all as before. Compared with B, back bluer and not quite so dark or shiny. Dark marks underneath faint, except 1 on each side about middle segment.	nearly as dark as B. 15 on leaves, all as C.	dark as B. Those on leaves as C, except 6, which are as dark as B and brown underneath.
Sept. 2.	All on leaves. 19 counted. 16 normal dark form as before, 3 more bluish on back, not at all shiny, but with very delicate white-lined pattern.	5 on sticks. Colour not noted in detail, but generally as dark as sticks.	12 on sticks. In 5 of these the marks underneath very faint indeed, in 2 quite gone. 10 on leaves, 2 with fairly distinct marks, 7 with faint marks, 1 with none. Backs shiny and fairly dark as before. 1 much lighter with a bleached appearance, bluish and showing the white lines distinctly. 1 on glass, faint undermarks and normal dark back. 2 on ground, 1 on roof the same.	5 on sticks, rest on leaves. Colour as before. 1 quite as dark as B.	2 on sticks. Rest on leaves, but 1 on glass. Not quite so dark as B, especially underneath.
Sept. 5.	4 on sticks, 1 on glass. 14 unshiny white-lined form as before. 5 shiny as before.	8 on sticks. 7 unshiny white-lined, 1 shiny. Rest on leaves, all unshiny but 1. 8 very dark brown underneath, 9 lighter, 10 intermediate.	10 still fairly dark and shiny on back. The rest (12) with the white pattern and much fainter darkness (the back almost same "value" as underneath). All on leaves but 1 on roof. Undermarkings very faint.	1 on roof, shiny dark back as before. 5 on leaves, unshiny white-lined form. Rest on leaves, shiny as before.	1 on sticks, shiny as before. 8 on sticks, unshiny white-lined. 6 on leaves, unshiny white-lined.

TABLE I *(continued)*

DATE IN 1909.	A. PAINTED CRIMSON STICKS.	B. BLACK TWIGS OF BIRCH.	C. WHITE WOOD STICKS.	D. PAINTED GREEN STICKS.	E. DEAD STICKS OF OAK.
Sept. 8.	1 on glass, 5 on sticks. 13 on leaves. Only 1 shiny. All more or less brown underneath (some a rich reddish brown).	10 on sticks. All very dark white-lined form, rich reddish brown underneath.	8 on sticks. Underneath creamy, nearly as light as sticks, with very faint marks. 2 still dark and shiny on back, the rest decidedly "bleached" looking. In 2 the darkness has almost vanished, and the back is a fairly uniform pale bluish colour. On leaves: 1 still shiny, 9 bleached, 5 quite light.	2 on roof, 11 on sticks, 3 on leaves. All fairly dark, white-lined form, brown marks underneath.	5 on sticks, rest on leaves All dark, white-lined on back and rich brown underneath.
Sept. 11.	11 on sticks. 1 on glass. 6 on leaves. All as B, but not quite so dark.	14 on sticks. Rest on leaves. Colour as before.	11 on sticks. 10 on leaves. 1 on glass. 1 small one on leaves still dark on back. In the rest, the dark marks have almost gone, leaving the body of a dirty cream colour all over.	9 on sticks. 1 on roof. Rest on leaves. 1 on leaves still shining. The rest as before.	4 on sticks. 1 on glass. Colour as before.
Sept. 14.	1 on sticks. 17 on leaves. Colour as before.	1 on roof. 1 on glass. 13 on sticks. Rest on leaves. Colour as before.	15 on sticks. 6 on leaves. 1 on glass. 9 of those on sticks and 5 on leaves still have faint traces of marks near head. In 6 on sticks these are very faint. 1 on leaves still dark.	15 on sticks. 3 on leaves. In 12 the backs are decidedly "bleached" looking. (4 of these as light as the darkest in C.)	4 on sticks. 1 on glass. Colour as before.

Sept. 17.	9 on sticks. 8 on leaves. The backs of some are getting "bleached."	18 on sticks. Colour as before.	15 on sticks. 4 have traces still on 3 segments. In the rest only on 2. 5 on leaves. 1 small and dark. 2 with traces on 3 segments. 2 on 2 only.	14 on sticks. 4 on leaves. In 16 the backs are bleached, 8 are as light as the darkest in C.	Not noted.
Sept. 20.	7 on sticks. 5 have changed skin. 2 changing. 10 on leaves. All changed but 2. Colour as before.	20 on sticks. 4 changing. The rest changed. In all that have changed the back is reddish black with very delicate white lines. In all but 5 the marks are no longer continuous but isolated.	14 on sticks. 7 on leaves. 1 on glass. 7 changing. Mostly of a dirty cream colour all over, with very faint greyish marks. 2 of the changing ones and 1 of the changed have stronger traces near head. 1 on leaves still small and black.	6 on sticks. 5 changing, 1 changed. 11 on leaves, 8 changing. 1 changing on roof. Colour as before.	5 on sticks. Rest on leaves, but 1 on roof. 9 changing.
Sept. 23.	11 on sticks. 4 of these black on back with thin white marks. 7 rather bleached. 1 very much so. 5 on leaves. 3 black. 2 rather bleached.	23 on sticks. White marks all isolated.	17 on sticks. 16 dirty cream with faint marks, 3rd stage; 1 2nd stage with stronger traces near head. 1 on glass. 2 on roof. 3rd stage, very faint markings. 1 small one on leaves still dark and shiny.	Not noted.	Not noted.
Sept. 26.		23 on sticks. 1 on leaves.	20 on sticks. All dirty cream with very faint markings. 1 small dark one on leaves.		

TABLE I *(continued)*.

DATE IN 1909.	A. PAINTED CRIMSON STICKS.	B. BLACK TWIGS OF BIRCH.	C. WHITE WOOD STICKS.	D. PAINTED GREEN STICKS.	E. DEAD STICKS OF OAK.
Sept. 29.	All but 2 on sticks. 8 reddish black as B. 6 rather bleached. 3 bleached nearly all over, not quite so light as C.	22 on sticks. The white lines very inconspicuous, being greyish or brownish. 2 on a black dead leaf, 1 of these very reddish. 1 on leaves, usual form.	20 on sticks, as before. The small dark one on leaves getting slightly bleached.	12 on sticks. 6 on leaves. Colour as C, but very slightly darker.	8 on sticks. 1 on glass. 1 on leaves: all dark and rather bleached on back.
Oct. 14.	4 on leaves. 12 on sticks. All dark as B, except 4, which are getting bleached and fawn-coloured.	As before. 1 more reddish than the others.	As before.	3 on leaves, rest on sticks. Colour as before.	3 on sticks, rest on leaves. Like B, but not quite so dark; very faint traces of green near tail in 2.
Nov. 11.	No change since Oct. 14.	All the larvae arranged for hibernation, having refused food for several days.			
March 11, 1910.	The elder being still in bud, the larvae were offered some ivy. A little was eaten.				
March 15, 1910.	Fed with elder.				
April 27, 1910.	Brownish, with distinct purplish crimson traces on underneath and sides. All but 8 removed to avoid crowding.	All rich purplish brown. All but 15 removed for transference experiment.	All same tone as sticks, as before. All but 15 taken for transference experiment.	Slightly darker than C, but not at all green.	Colour as A, but darker and more streaky.
June 13, 1910.	All pupating.				

II. *Transference experiments.*

In order to find out to what extent the larvae were susceptible after hibernation, some were taken from the black surroundings in B, and given white sticks as in C. In the same way some were taken from C and put into a case containing black sticks. The results are best shown by a table. One curious point is that the white sticks produced their full effect sooner than the dark ones, whereas in the experiments on the early stages the reverse was the case.

TABLE II.

DATE IN 1910.	B^1 WHITE STICKS.	C^1 BLACK STICKS.
March 11.	8 introduced from B.	5 introduced from C.
April 27.	1 lightest form (as in C). 3 nearly light, as C. 1 slightly darker.	2 still as light as C. 1 of these small. 2 light pinkish brown. 2 smaller and rather darker.
April 28.	All but 1 as light as C. This one nearly so.	
April 30.	*Returned to black sticks.*	All as before.
May 5.	4 still as light as C. 1 much darker.	
June 13.	No change. All pupating.	All pupating.

III. *Experiments on the pupa of* U. sambucaria.

When the first of the larvae used on the previous experiments began to spin, all were arranged in various environments with a view to testing the susceptibility of the pupae. In the first set (Table III) the larvae were left in the same environments that they had hitherto occupied. The results of this set show clearly enough that when the same conditions are continued, the pupae are as well adapted to them as were the larvae. What they do not show is to what period of susceptibility the adjustment is due. Prof. Poulton thinks that it is effected just before pupation, and independently of the previous environment of the larvae. The results shown in Table

IV point to an opposite conclusion. The larvae in this set were those used in the transference experiments: in the table I have repeated the results of B (Table III) for comparison.

In the third set, the larvae were placed during pupation in compartments lined with variously-coloured papers and leaves. The results, so far as they go, seem to show that the pupae *have* a considerable power of adaptation, but as in this set I omitted to note the previous history of the larvae (they were taken at random from various environments), there is no real evidence of the extent to which the pupal colours are independent of the larval. I hope to repeat this experiment with more success next year.

TABLE III.

RECEPTACLE.	COLOUR OF PUPAE AND COCOONS.
A. (Crimson sticks).	2 with no cocoon. 1 darkest form as B, 1 rather lighter. 2 cocoon of old skins, etc. 1 darkest form, 1 rather lighter.
B. (Black sticks).	8 hardly any cocoon. Dark brown, smoked with black (Figs. 1, 1*a*). 3 cocoon of bits of leaf. Same colour.
C. (White sticks).	6 hardly any cocoon. Cream-coloured with rather sparing smoky specks and streaks. 2 rather more profusely speckled. 1 in cocoon of skins, etc., like these (Figs. 2, 2*a*).
D. (Pale green sticks).	1 slight cocoon, strong ochreous tinge with slight black marks. 1 slight cocoon, darkest form.
E. (Dark lichen-covered sticks).	3 no cocoon, darkest form. 2 cocoons of bits of bark, same colour.

IV. *Note on some experiments on* O. bidentata.

In the summer of 1909 I experimented with about 20 *bidentata* larvae given to me by Prof. Poulton. The results are not worth giving in detail, as the forms produced were exactly the same as those already obtained and described by him.*

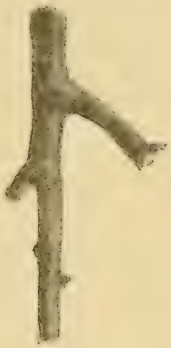
* Trans. Ent. Soc. Lond., October 5, 1903.

They were as follows:—

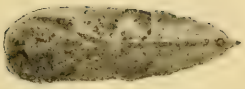
(*a*) Black sticks painted to a dark crimson produced bluish-black larvae.

(*b*) Brown sticks of sycamore painted with white rings

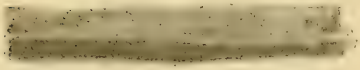
1.



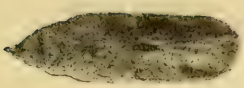
1*a*.



2.



2*a*.



3.

3*a*.

about 3 mm. wide, and the same distance apart; cream-coloured larvae with smoky markings on back.

(*c*) Dark twigs of larch with patches of grey lichen: very dark larvae with green and white lichen-like pattern.

(*d*) Slips of cream-coloured wood: cream-coloured larvae with slight smoky pattern.

(*e*) Purplish-black twigs of birch: bluish-black larvae.

(*f*) Black twigs of oak with pink spots painted on them: bluish-black larvae.

(*g*) Slips of white wood painted with scarlet squares (length of side about 2 mm.): cream-coloured larvae with faint smoky pattern (slightly darker than in (*d*)).

It will be noticed that the twigs painted in geometrical patterns produced no corresponding effect. The results of all the experiments seem to show that although the individual larvae and pupae are able to conceal themselves very effectually among surroundings to which the species is accustomed, they are powerless to effect any appropriate adaptation to an "artificial" environment.

TABLE IV.

ENVIRONMENT OF LARVAE FROM HATCHING UNTIL AFTER HIBERNATION (AUG. 1909 TO MAR. 1910).	MAR. AND AP., 1910.	MAY AND JUNE TILL ABOUT 6 HOURS BEFORE PUPATION.	ENVIRONMENT FOR 6 HRS. BEFORE PUPATION.	PUPAL COLOURS PRODUCED.
Black.	Bl.	Bl.	Bl.	8 with not much cocoon, 3 in cocoon of bits of leaf. All very dark brown smoked with black.
Black.	Bl.	Wh.	Bl.	2 in cocoons of laef, slightly less smoky than the last set.
Black.	Bl.	Wh.	Bl.	2 no cocoon, 2 in leaf cocoons. These 4 of a uniform light reddish brown with very sparing black specks. 1 in leaf cocoon, darkest form.

V. *Notes on the apparatus used.*

The larvae were kept in clear glass cylinders or lamp shades, varying from 8 to 10 inches in height, and from 3 to 5 in diameter. The tops were covered by white muslin or calico. The floors were of wood covered with white paper: a hole in each floor allowed the stems of the food-plant to pass through into a jar of water. As the larvae became larger, some were transferred to other cylinders, so that they were never crowded.

The pupae which were not left in their original environments were tested in cardboard compartments (about

3 in. deep by 1 in. wide) with glass fronts, at an angle of about 45 . Both larvae and pupae were kept in a strong north light.

The hut in which the experiments were carried out was roofed with iron, and was generally a good deal warmer than the outside air. This probably had the effect of hurrying on the stages, for the larvae never attained a greater length than about $1\frac{1}{2}$ in.

TABLE V.

RECEPTACLE.	COCOON, IF ANY.	PUPAL COLOURS.
Black.	Scanty.	1 light reddish brown, 3 very dark.
Dark green.	3 cocoons of variously-coloured paper and leaf.	Darkest form.
White paper.	2 cocoons of paper and leaf.	1 darkest form, 1 greyish.
White calico.	1 cocoon of white threads.	Lightest form (cream-coloured).
Bark and grey lichen.	2 cocoons of bits of paper, etc.	Fairly dark.
Dead oak leaves.	1 cocoon of leaves.	Exact colour of leaves (Fig. 3, 3*a*).

VII. *On the early stages of* Latiorina (*Lycaena*) orbitulus, *an amyrmecophilous Plebeiid "Blue" butterfly.* By T. A. Chapman, M.D., F.Z.S.

[Read November 16th, 1910.]

Plates XI—XXVII.

Nothing seems to have been recorded about the earlier stages of this species, except Rogenhofer's record in the Verw. Zool. Bot. Ges. Wien in 1875, until accident afforded me the opportunity of making some observations in 1908.

Rogenhofer appears to have met with the larvae on the Stelvio Pass, under stones, when preparing to pupate, and gives us a very good description of it, though, as it happens, without any reference to the one point that gives this larva its greatest interest, viz. the entire absence of a honey-gland on the seventh abdominal segment and of the correlated fans on the eighth.

In the summer of 1908 I found *L. orbitulus* ovipositing on *Androsace vitaliana*; my experiences are noted in the Entomologist, Vol. xlii (1909), p. 105. Failure in a supply of the food-plant prevented my getting the larvae into the 2nd instar. In the following year I followed the matter up at Arolla, and found that the food-plant there was *Soldanella alpina*. I recorded the Arolla observation in the Entomologist, Vol. xlii, p. 221 (1909). The young larvae I obtained furnished me with one specimen in the third (hibernating) instar, but this did not survive the winter, I found, however, that it was without the ant-attracting honey-gland (and fans) characteristic of the Blues, and this determined me, if possible, to carry my observations further. The honey-gland is present in this stage in all the species that possess it that I have examined. The question was, did it appear later in *orbitulus*, or was it entirely absent?

Taking into account the habits of growth of *Androsace vitaliana* and of *Soldanella*, I thought that to search for the larvae in spring on the latter plant was not very hopeful, whilst the tufted growth of the *Androsace* made the latter plant one on which the larvae could probably be searched for with success. The result was that I found myself at Binn on June 20, 1910. I knew approximately the places

where the *Androsace* grew there, and where *L. orbitulus* had been fairly common two years before.

The weather was chiefly to blame for nothing but some reconnoitring being done until June 28, when I visited the Tschampigen Alp (circa 7000 ft.), and with the aid of my sisters and nephew (Mr. C. L. Milligan) I succeeded in obtaining over a dozen of the desired larvae.

The smallest found was about 6 mm. long, the largest 14 mm.; 13 mm. seems to be the length of an average full-grown larva not specially extended.

Several were found somewhat hidden in rather bushy plants of *Gregoria* (*Androsace*) *vitaliana*, but most were fully exposed, on or close to the plant, as if sunning themselves, though one or two of these were actually feeding on the flowers.

In captivity they will eat the leaves of the plant, but preferred the flowers, eating enough of the corolla to enable them to reach the centre of the flower, and they were seen with their heads buried deeply therein, and abandoned flowers consisted of nothing but the calyx, the whole interior having disappeared, probably uneaten portions of the corolla had dropped off.

In the autumn, before hibernation, the larvae have only the leaves to eat, either of *Androsace* or *Soldanella*, probably in spring they eat the flowers of the latter plant as they do those of *Androsace*.

The larvae obtained at Binn were in the fourth and fifth (last) instars, except one specimen which was found with an ichneumon cocoon attached to it; the larva was alive, and remained so for some time, it was still in the third hibernating instar, the same stage to which my most advanced larva had attained in the preceding autumn, thus showing that I had obtained all the stages, the relative sizes of the heads of the five instars obtained being in a series showing none was absent.

The measurements taken of length of head were—

	Actual measure.	An exactly proportional series would give
1st Instar	·18 mm.	·18 mm.
2nd „	·27 „	·27 „
3rd „	·42 „	·41 „
4th „	·60 „	·60 „
5th „	·84 „	·90 „

In measuring from preserved specimens, the measurements are as close to the proportional series as one could reasonably expect.

Already in the first stage the larva, when somewhat grown, has a colouring approaching that of the full-grown larva, and in the third stage they are, so far as my few specimens indicate, quite like the full-grown larva; the panoply of hairs, lenticles, etc., becomes more abundant with each moult. A full description of these would be very lengthy, and not convey as good an idea of the facts as a few glances at the photographs of the larval skins of each stage presented herewith. The most notable peculiarity of the larva in the first instar is the marked development of the hair of tubercle III. In most Blues III appears to be represented by two very minute hairs, those that approach very near to *orbitulus* as regards this hair are *astrarche* and *minimus*, the latter not a Plebeiid; in these there seems to be a definite III, with or without a minute hair point, making up the two that are nearly always present.

I may quote my description taken from the living, full-grown larva, though this is hardly necessary, with Mr. Knight's excellent figures to refer to.

"It is of a bright, but rather bluish-green (assuming this to be the ground-colour), with a brown dorsal stripe bordered on each side with white, and on the middle of each segment by pink. On the 'slope' of each segment, centrally, is a short dark line or patch, obliquely placed, occupying the hollow above the spiracle. The obliquity is downwards and backwards, it is conspicuous on the 3rd thoracic and first 6 abdominal segments, but exists before and behind this, in most specimens somewhat obscurely.

"The lateral line along the flange is white, margined above by pink or pinkish-brown, more or less bright in different specimens, which graduates into the green slope below the spiracles. Below the white band is a darker border, shading into the dull olive-green of the underside. The spiracles are small black points. In one specimen, the oblique dark lines on the slope are much extended, and the colour bordering the dorsal and lateral lines is very broad, so that the green ground-colour is very restricted; this specimen is young in last skin and may become more normal later, but cannot wholly do so (by comparison with fairly normal younger specimens).

"The surface is everywhere furnished with black hair points, not very closely placed, and from these short black hairs arise, though without a lens one is inclined to regard the larva as quite smooth,

its very shining and polished skin adding much to or almost causing this illusion. The head and legs are black."

The form of the larva is the usual Lycaenid one, up to 14 mm. long and 3 to 4 wide, according to the amount of stretching out; a trifle wider anteriorly, but of nearly uniform width from the mesothorax to the sixth abdominal. The 7th to 10th abdominal are perhaps a little less fused together than usual in Lycenids. Each segment rises dorsally into a low arch, and the lateral margin (seen dorsally) is a series of slight curves. The remarkable feature of the larva is the absence of a honey-gland.

On July 4 several larvae had suspended themselves on the side or lid of the box for pupating. The carpet of silk is slight, the cremastral pad hardly stronger than the rest of the carpet, and the girth consists of half-a-dozen threads nearly all separate, and arising from a scattered base, but connected together near it by a few cross threads. The whole arrangement is very slight and flimsy and quite unequal to bear the slightest strain.

As the larva approaches pupation the colours get duller, the pink almost disappears and the white gets dim. The brown dorsal line with a little white near it, the oblique brown dashes of the slope and the brown lateral lines are all much of a tint. The lateral line is lost on the thorax (owing to wings beneath) and the thoracic segments, especially the mesothorax, become larger. The head is quite sunk in the prothorax, the thorax is nearly one-third of the total length.

On July 10 the first specimen pupated; immediately on pupation the pupa is of the same brilliant colours as the larva at its best, not the dull ones immediately preceding the change; the oblique lines are lost on the thorax, but the white lateral line, with broad, pink band above and brown below, is very distinct, even where covered by the wings, which are quite transparent. After some hours the thorax and wings become of a bluish-grey (leaden lavender), the abdomen almost yellow rather than green, but very pale. The red dorsal line very narrow on thorax, but spreading along front of prothorax, head colourless (transparent glassy green). Tracheal nervures of wings very distinct in the transparent tissue. It may almost be called hairy, with short white hairs most numerous anteriorly and posteriorly.

Twenty-four hours later the head, thorax and wings are very dark, a nearly black-brown, not quite obscuring the underlying green, the wing veins rather paler, a dark-ochreous.

The dark dorsal line hardly visible on thorax owing to the general darkening. On the abdomen the darkening is not quite so great, so that the brown markings are distinct on a brownish-ochreous ground-colour, through which the underlying green is still very obvious. The abdominal incisions (1 to 6) look double, owing to an intersegmental subsegment, present as a very narrow raised rib. The hairs are rather more evident, especially in profile, of a pale-ochreous tint.

Later the pupa becomes darker, with little distinct marking except the paler wing venation.

The first imago, ♂, emerged August 9.

On July 1 a larva, apparently still in the hibernating stage, was found on the Eggerhorn on *A. vitaliana*, it rested on top of a small yellow *Apanteles* cocoon, whose tenant had escaped from its host on the left side of the first abdominal segment. The larva lived for a further ten days. The cocoon gave exit on August 5 not to an *Apanteles* but to a hyperparasite. In the search for larvae of *orbitulus*, several of these *Apanteles* cocoons were seen, but were left alone, as their connection with *orbitulus* was not suspected.

There is at least one other parasite of the larva of *orbitulus*; a full-grown larva died and seemed to be hardening, and supposing it to be suffering from fungus-disease, it was put in pickle, so as not to sacrifice a better example. On mounting it, however, it was found to contain an ichneumon well advanced towards maturity. It was further damaged in dissecting larva before its existence was known. In the result Mr. C. Morley says in spite of the difficulties thus put in his way that he has "little doubt that it is *Cremastus bellicosus*, Grav. ♂, an Ophionid Ichneumon."

It is obvious, with two parasites detected in my small acquaintance with the larva, that its being unattended by ants is not due to its having no enemies, from whom ant-protection would be desirable.

The point of great interest in this species is the absence of the honey-gland. It belongs to the Plebeiid section of the Blues, which are generally regarded as the most typical of the myrmecophilous Blues.

In order that this fact may be fully demonstrated and not rest merely on my *ipse dixit*, I present photographs of the skin of the larva at each stage, and enlarged ones of the region of the seventh abdominal segment, where the honey-gland would be, if present. They show, instead, hairs precisely as in the other segments, or rather in their proper order as varying a little from segment to segment.

The photograph of the prothorax (Pl. IX) shows the change in the character of the hair bases at the last moult, and both show very well the peculiar angular hair of the plate.

The detailed plates of the pupa-skin show the nature of the sculpture and armature in different regions, in a way more easily useful to any one interested than a prolonged description.

Herr Viehmeyer, who has specialised on the honey-glands of Lycaenid larvae, has only met with *V.* (*Lycaena*) *optilete* as a species amongst our European "Blues" without the honey-gland, and this only on the basis of blown specimen in the Staudinger collection. There can be no doubt, however, that such evidence is quite trustworthy. It is tolerably certain that *pyrenaica*, the Pyrenean cousin of *orbitulus*, will be found to agree with it in this respect.

The possession of a honey-gland is so universal in the Blues as to be almost a subfamily character, and one inclines to search for reasons for including in the Lycaenines those species usually placed in other subfamilies that possess this remarkable organ. How are we to explain its absence in these species which are typical Lycaenines, and cannot be located by any excuse outside the subfamily?

Why they are without it is possibly because they are such high-level species that few, if any, ants exist in their habitats; *optilete* and *orbitulus*, with *pheretes*, whose larva is practically unknown, are the species having their habitats at the highest level of all the European Blues (from 6000 to 8000 ft. in the Alps, rarely somewhat lower, especially in the case of *optilete*). What the numbers and activities of ants are at this elevation I do not know; it is a point that wants investigating.

This may be a "final cause" for these species wanting the honey-gland. A more important question is, have they lost it, or did they never possess it? If they never had it, then these species must be ancestral to all the

other Blues; if so, it should be possible to find some characters in common to *optilete* and *orbitulus* which make them less specialised than the others, *i. e.* some further character than the want of the honey-gland. The only trace of such a character I know of is that the segments of the larva 7, 8, 9 and 10 abdominal are less fused into one than in various other Blues, *corydon* and *bellargus* for example. On the other hand, if they once had the honey-gland and have since lost it, it is difficult to explain how they have regained the normal armament of dorsal hairs that disappear at the site of the honey-gland in those species that possess it.

There is one point worth noting, viz. the structure of the *Ædoeagus*.

In a short but important note on this structure in the Plebeiid Blues in the Ent. Record, Vol. xxii, p. 101, I pointed out that this structure has a peculiar character in *semiargus*, *optilete*, *pheretes* and *orbitulus*, placing these together and separating them from the other sections.

When I made that note, I had no suspicion that it had any bearing on the present question. How or why *semiargus* falls into the group is for the present purpose a somewhat obscure puzzle, but leaving it on one side, it places the other three species together, all of which have a high-level distribution, two of them are without honey-gland, and it would not perhaps be rash to expect that the third will be found to be so also, but at present this point is not known.

These four species have one other character in common, viz. they are without the basal spot between veins 1 and 2 of the hindwings beneath, a spot rarely absent in Plebeiids, except in Tutt's genus *Hirsutina*.

These facts suggest that these three species are closely related, and that they are derived from a common ancestor, who never had, or who lost the honey-gland. Notwithstanding that they differ in facies, perhaps more than any other Plebeiids do.

The hypothesis that these species are at the base of the myrmecophilous species seems much more than doubtful in at least two respects. The myrmecophilous Lycaenids belong to a number of different sections, and the idea that they have a common ancestor in species of one of these sections, that except in this one respect are fairly typical numbers of that section, is contrary to our idea of

ancestral species, which must present characters that are primitive in several directions, and do not belong to one specialised group. The other difficulty is even stronger.

There are other sections of the Lycaenids which possess both myrmecophilous and amyrmecophilous species, and their amyrmecophilous species would be equally entitled to claim ancestral rank. To keep within Palaearctic species, the Theclas are largely amyrmecophilous, yet *T. w-album* has a somewhat ill-developed honey-gland, whilst *Neolycaena*, *Thestor* and *Callophrys* have well-developed glands.

If then these amyrmecophilous species never had a gland, we are driven to believe that these glands originated and developed, absolutely *de novo*, in half-a-dozen, perhaps a score or more instances. That such a curious and special organ, not found anywhere else, should appear so many times over in one group, always with essentially the same structure and always in the same place, and accompanied in nearly all cases by the remarkable fans of the following segment, is altogether in opposition to what we know of evolutionary processes, and involves too large a draft on our credulity.

We are driven then to suppose that all the groups, some of whose species possess these special organs, have a common ancestry, and that those genera and species within these groups that are without them have lost them.

How, in this case, can the fact be accounted for that in the species before us, and no doubt in others (certainly in the Theclids), the segment that usually carries the gland shows no trace of ever having possessed it?

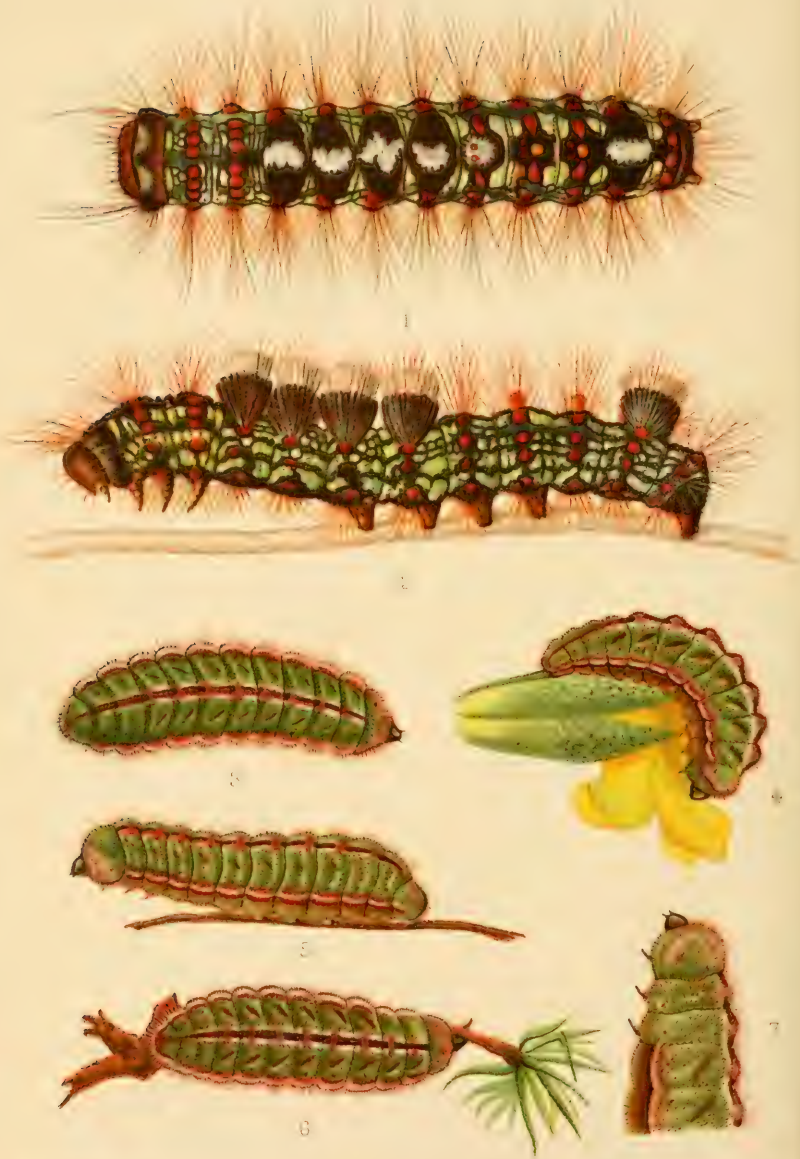
When the honey-gland is present, the special long hairs (tubercles I and II) of this segment are wanting. There is, indeed, reason to believe that the honey-gland results from a modification of these particular tubercles. The surrounding hairs are also specially modified. In *L. orbitulus* the armature of hairs on the seventh abdominal segment takes its place as entirely in accord with that of the other segments, and has just the arrangement we would expect on the hypothesis that it was an ancestral form that had never had a honey-gland.

The forces available to eliminate the honey-gland in the absence of ant attendants are considerable. There is the loss of the constantly necessary selection for maintaining it, a now useless and indeed wasteful organ must rapidly degenerate, but there is further a strong selective force for

its abolition in the fact that most educators of Lycaenid larva have observed that in the absence of attendant ants the gland secretion is apt to exude and accumulate over the gland, where it decays and moulds, and infecting the larva commonly leads to its death. There is also the pressure of the common inheritance of the abdominal segments which perhaps deserves a word of explanation. It will probably require more than this note to make zoologists accept it as an existing agency, but I have myself no doubt that it is a *vera causa* in cases like that before us.

There is abundant ground for assuming, without going outside the Lepidoptera, still less citing orders of Annulosa, more distantly allied, in which the numbers themselves of the segments vary from group to group, that the abdominal segments have to a great extent a common inheritance, and vary together (from species to species). It is probable in a high degree that this inheritance, which tends to pass from one segment to another any feature such as the dermal armament of the dorsal region which we are considering is in continual action, tending to eliminate the honey-gland and replace it by an armament similar to that on the other segments, and that the honey-gland is only preserved, where it is preserved, by its usefulness, giving it an efficient selective value.

A long essay would be necessary to show how this common inheritance, say, of the dorsal dermal armature of the abdominal segments, may be found enforcing the uniformity of these structures. Where they differ from each other there is usually some very special object in view, but in the mass of Lepidoptera these segments are identically armed and coloured, yet considering how various this armature and colouring is in different groups, it might be expected that a good deal of variety would be found in the different segments of one larva, much more frequently than actually occurs, were there not some force keeping them together. The identical brushes on the first four segments in *Orgyia*, the black dorsal pencils in *Acronycta leporina*, which vary so much in their number and size, may be cited as instances where these segments inheriting one from another is a much more probable explanation than the only obvious alternative one, viz. a common response to a common environment.



[illegible] [illegible]

LARVAE OF { ORGYIA SPLENDIDA [illegible] 4
LATIORINA ORBITOLDE [illegible]

Explanation of Plates.

Plate XI.

Fig. 1. *Orgyia splendida* (Moncayo), dorsal view × 4.
2. „ „ „ lateral view × 4.
3. *L. orbitulus*, dorsal view of full-grown larva × 3½.
4. „ lateral view on flower of *Androsace vitaliana*.
5. „ „ „ „ „ „ „
6. „ dorsal view on flower of larva with left side of thorax abnormal.
7. Left side of front of same larva, more enlarged and showing want of markings, the wings (?) are represented by spiracle-like nodules. This specimen produced an imago with left wings markedly smaller than right (regenerated ?).

(See Trans. South Lond. Ent. Soc. 1910.)
Drawings by Mr. E. C. Knight.

Plate XII.

Fig. 1. Two eggs of *L. orbitulus* on leaves of *Androsace vitaliana* × 10, and empty shell, and one × 50.
2. Eggs of *L. orbitulus* on leaves of *Androsace vitaliana* × 20.
3. Eggshell × 150.
4. Micropylar area × 350.

1 and 2 photo by A. E. Tonge.
3 and 4 „ F. N. Clark.

The photographs from which the following plates are taken are by Mr. F. N. Clark, and are on the same lines as those with which I supplied Mr. Tutt to illustrate Lycaenids in the "British Lepidoptera."

Plate XIII.

Skin of larva in first stage × 67.

Plate XIV.

Skin of larva in second stage × 40.

Plate XV.

Skin of larva in third stage × 18.

Plate XVI.

Skin of larva in fourth stage × 19.

Plate XVII.

Skin of larva in fifth stage (last) × 15.

Plate XVIII.

Skin of larva in fifth (last) instar × 18.

Plate XIX.

To show dorsum of 7th abdominal segment (honey-gland region).

1. In second instar × 50.
2. „ third „ × 60.

Plate XX.

3. In fourth instar × 60.
4. „ fifth „ × 60.

Plate XXI.

Showing prothoracic plate in fourth (1) and fifth (2) larval instars × 100.

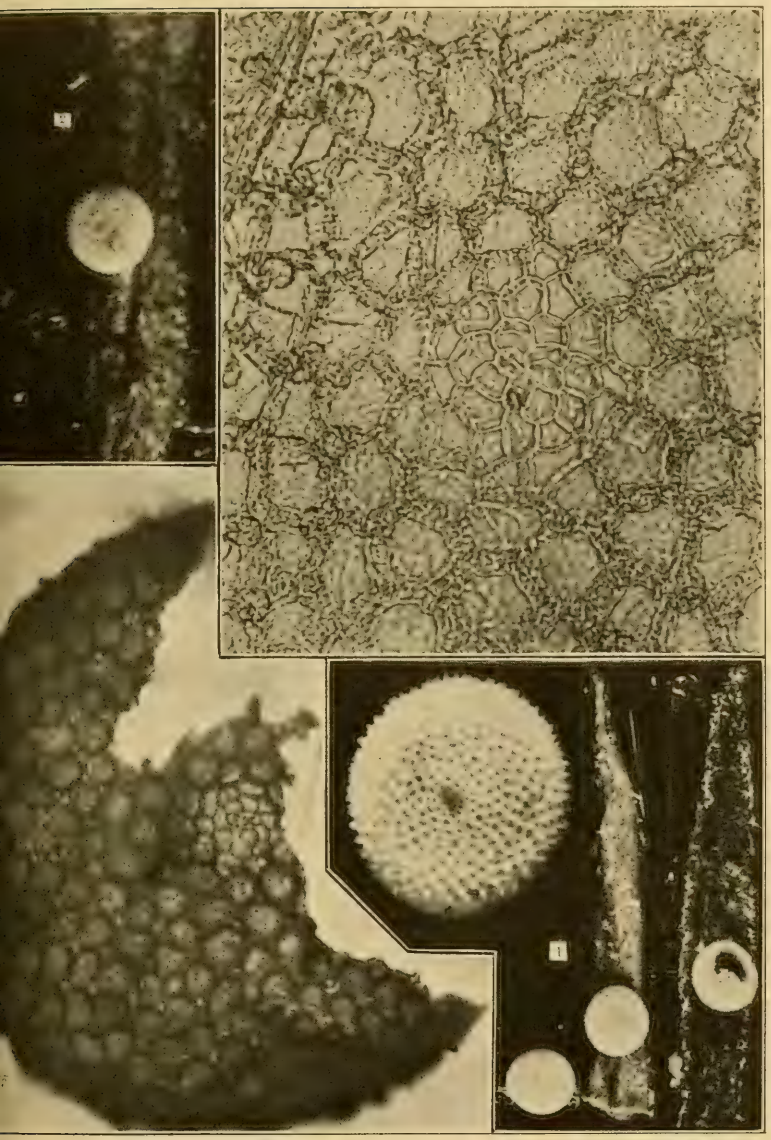
Plate XXII.

Showing 1, prolegs and 2, claspers of last stage larva × 100.

Plate XXIII.

Fig. 1. Leaf of *Soldanella alpina* × 4, showing how young larva makes small round holes and mines out the intermediate tissue of the leaf.

2. Pupa case spread out × 6.



oto. A. E. Tonge,
F. N. Clark.

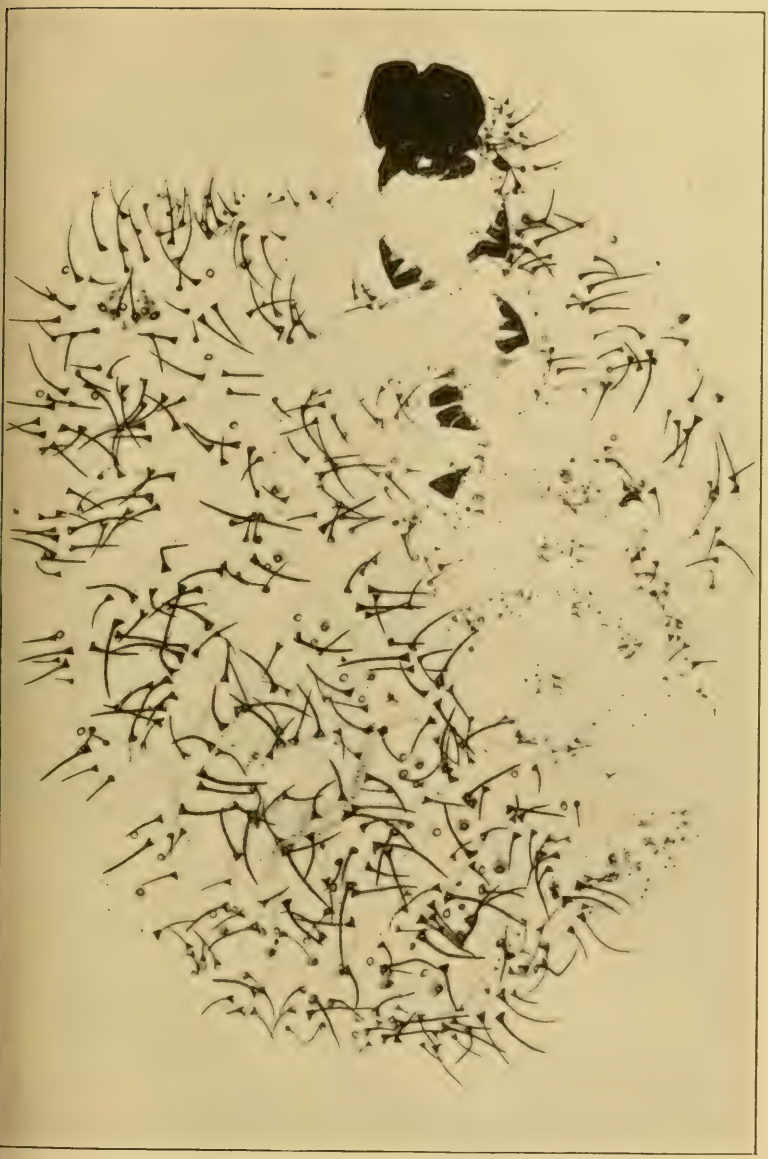
C. Hentschel.

OVA OF LATIORINA ORBITULUS.

Photo, F. N. Clark. *C. Hentschel.*

LARVA SKIN OF LATIORINA ORBITULUS.

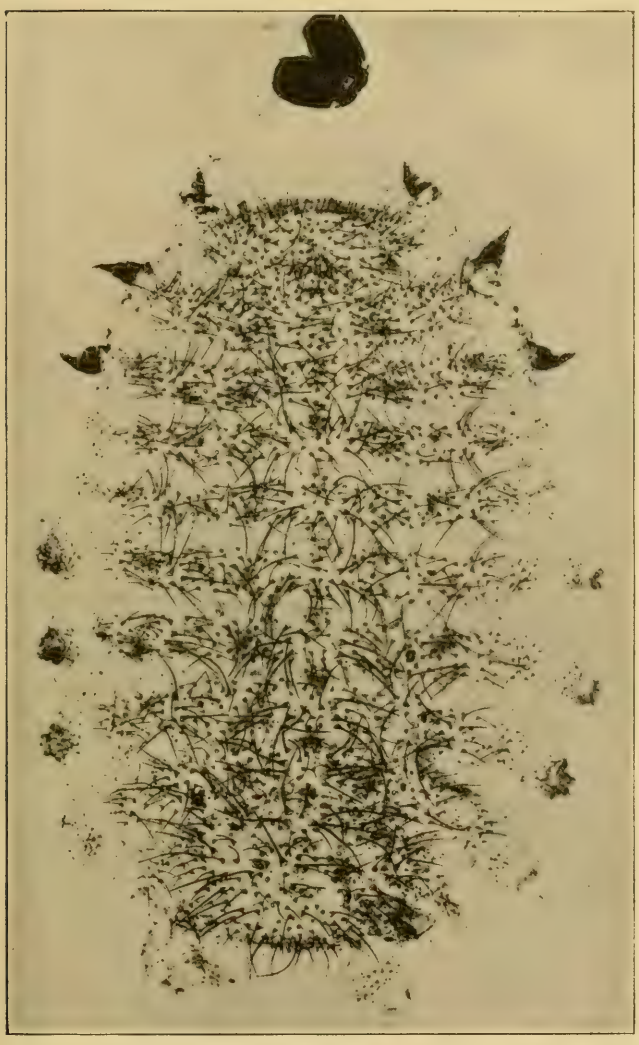
First stage × 67.



Photo, F. N. Clark. *C. Hentschel.*

LARVA SKIN OF LATIORINA ORBITULUS.

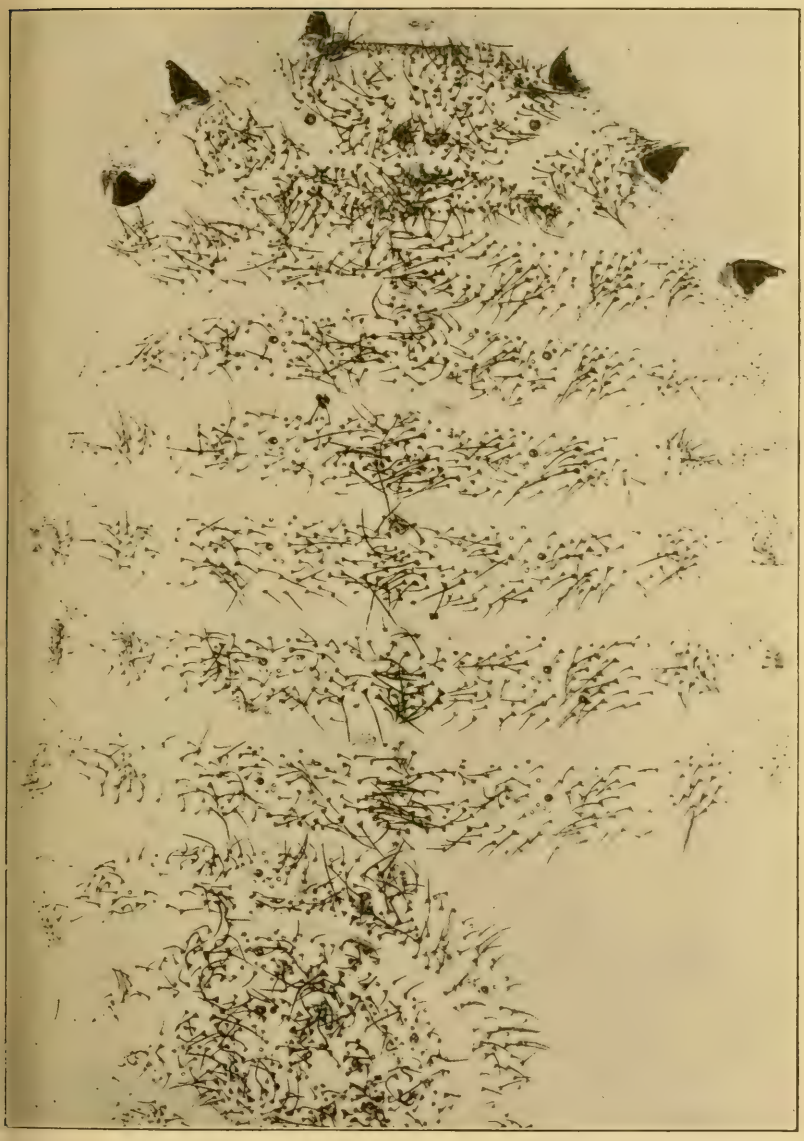
Second stage × 40.



Photo, F. N. Clark. *C. Hentschel.*

LARVA SKIN OF LATIORINA ORBITULUS.

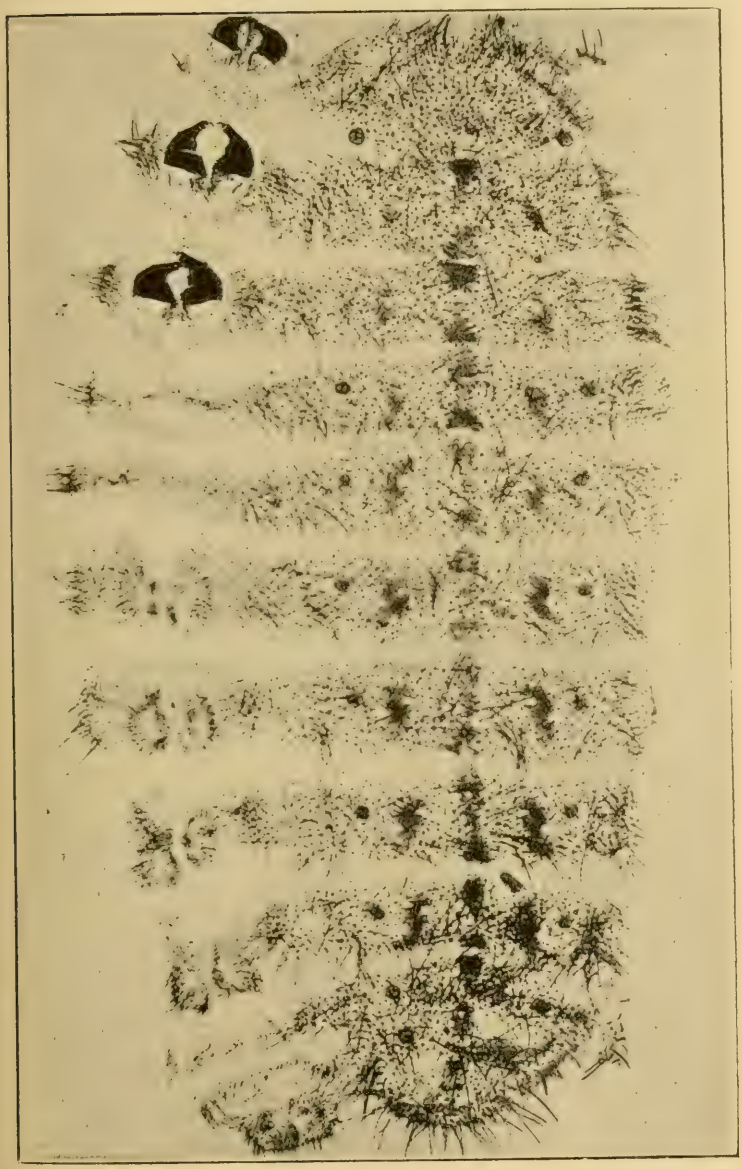
Third stage × 18.



Photo, F. N. Clark. *C. Hentschel.*

LARVA SKIN OF LATIORINA ORBITULUS.

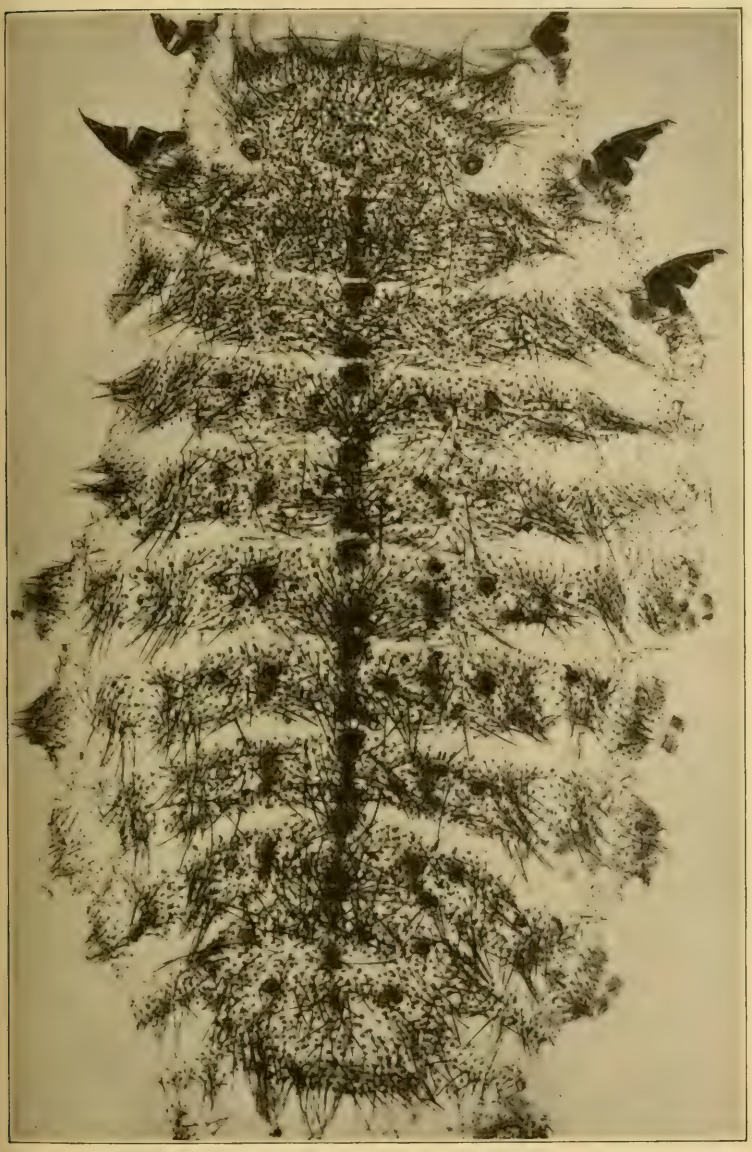
Fourth stage × 19.



Photo, F. N. Clark. *C. Hentschel.*

LARVA SKIN OF LATIORINA ORBITULUS.

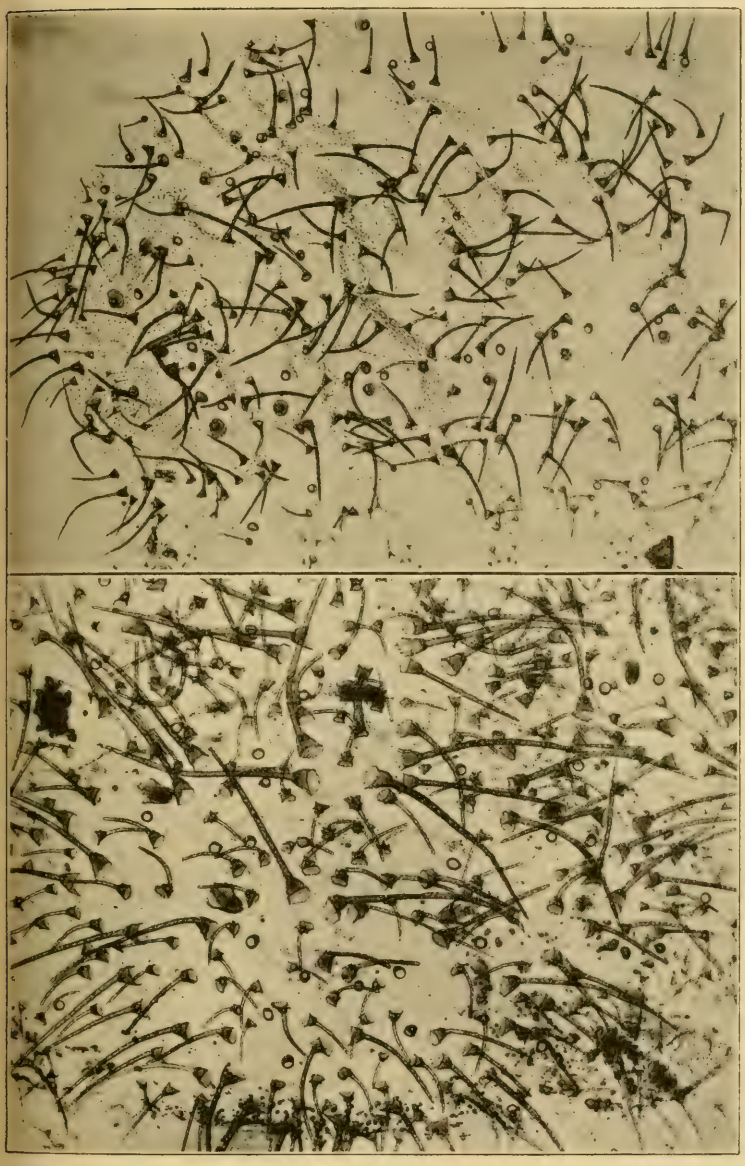
Fifth stage × 15.



Photo, F. N. Clark. *C. Hentschel.*

LARVA SKIN OF LATIORINA ORBITULUS.

Fifth stage × 18.



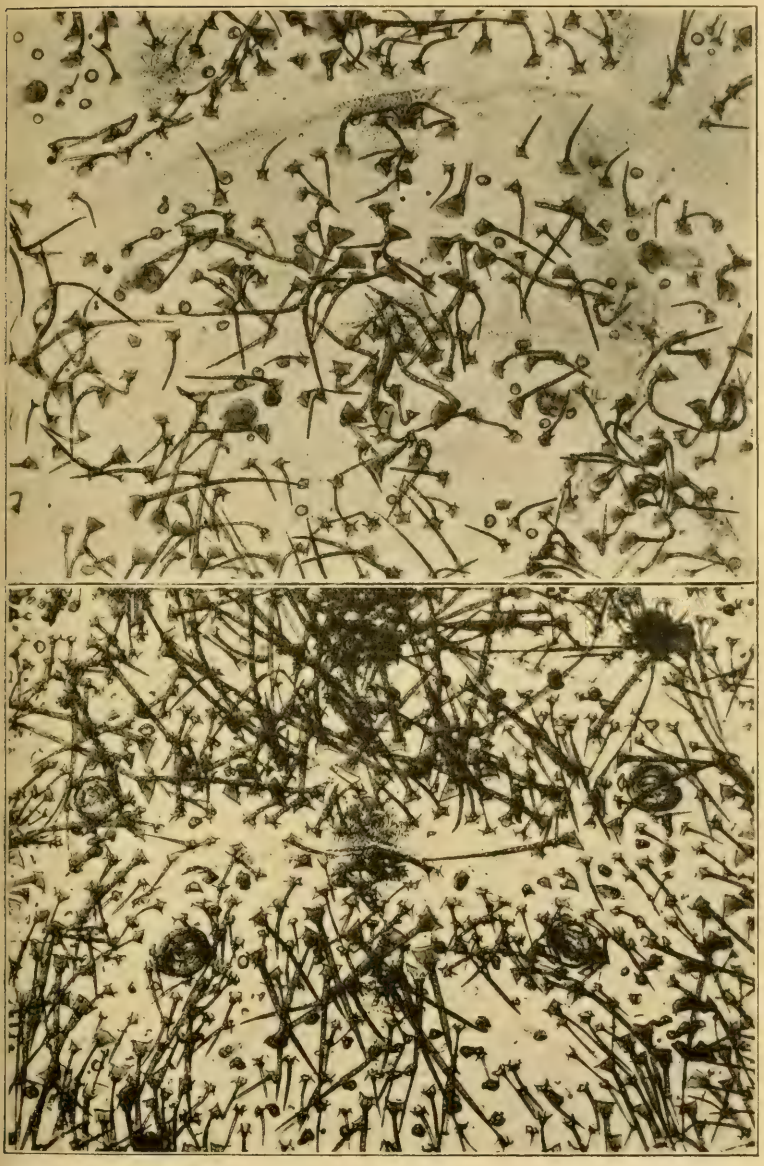
1

2

Photo, F. N. Clark. *C. Hentschel.*

LARVA OF LATIORINA ORBITULUS.

Honey-gland region (1) in second instar × 50, (2) in third instar × 60.



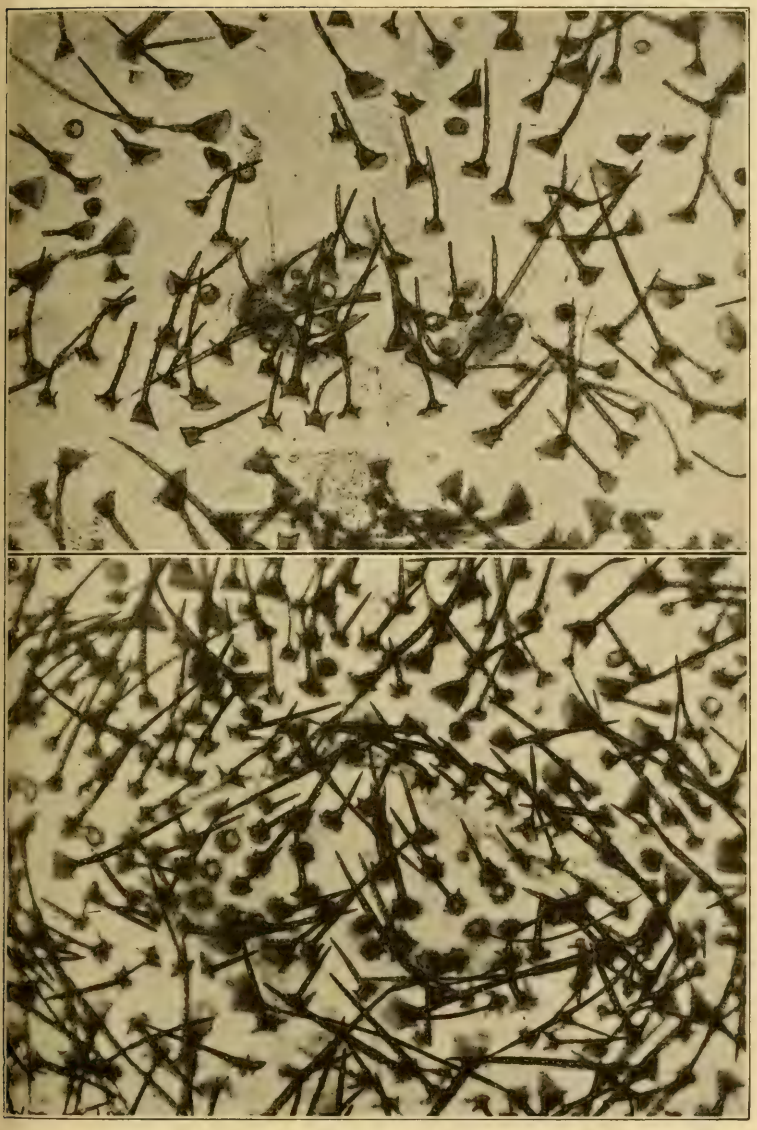
3

4

Photo, F. N. Clark. *C. Hentschel.*

LARVA OF LATIORINA ORBITULUS.

Honey-gland region (3) in fourth instar × 60, (4) in fifth instar × 60.



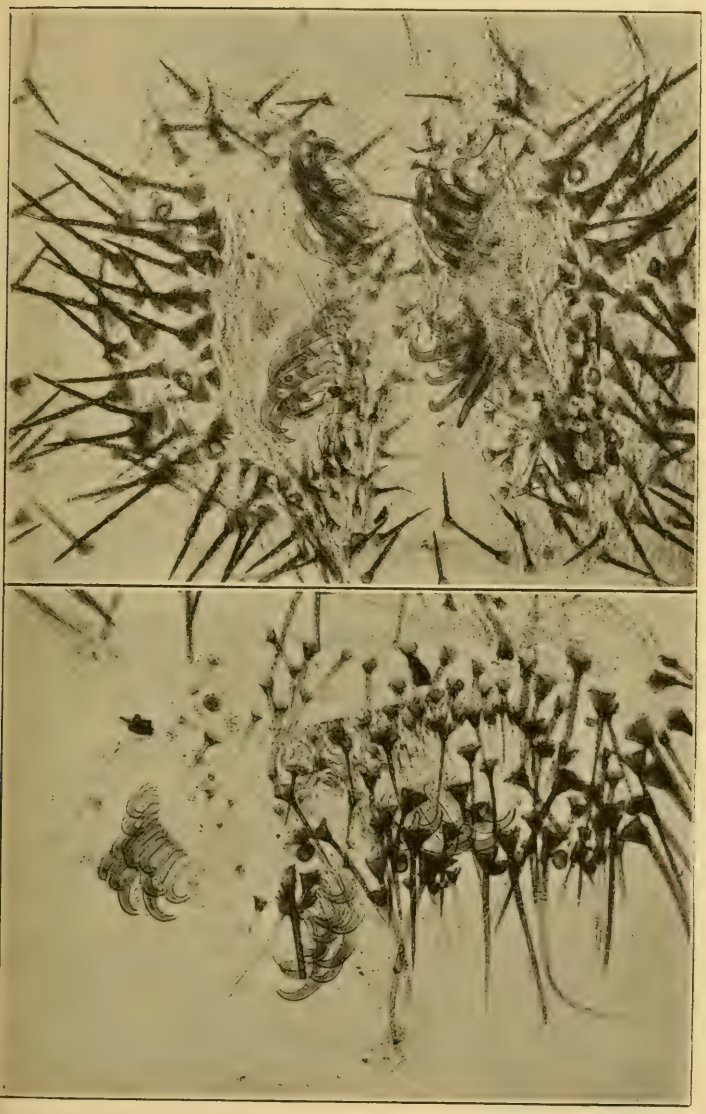
1

2

Photo, F. N. Clark. *C. Hentschel.*

LARVA OF LATIORINA ORBITULUS.

Prothoracic plate in (1) fourth, and (2) fifth instar × 100.



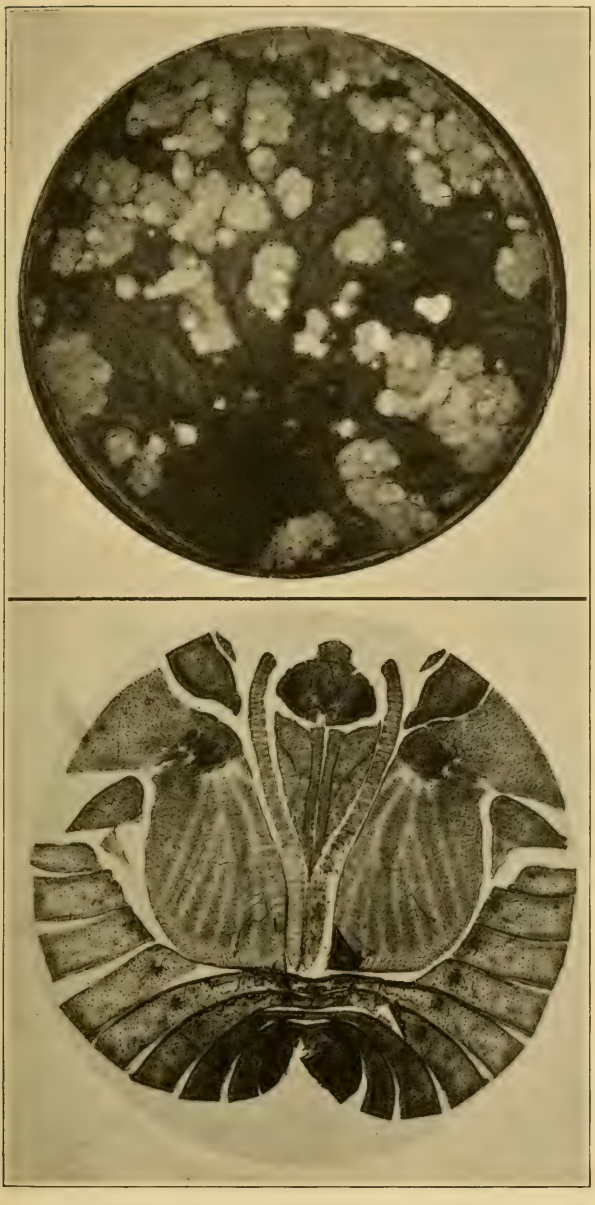
1

2

Photo, F. N. Clark. *C. Hentschel.*

LARVA OF LATIORINA ORBITULUS.

(1) Prolegs, and (2) Claspers, in last stage × 100.



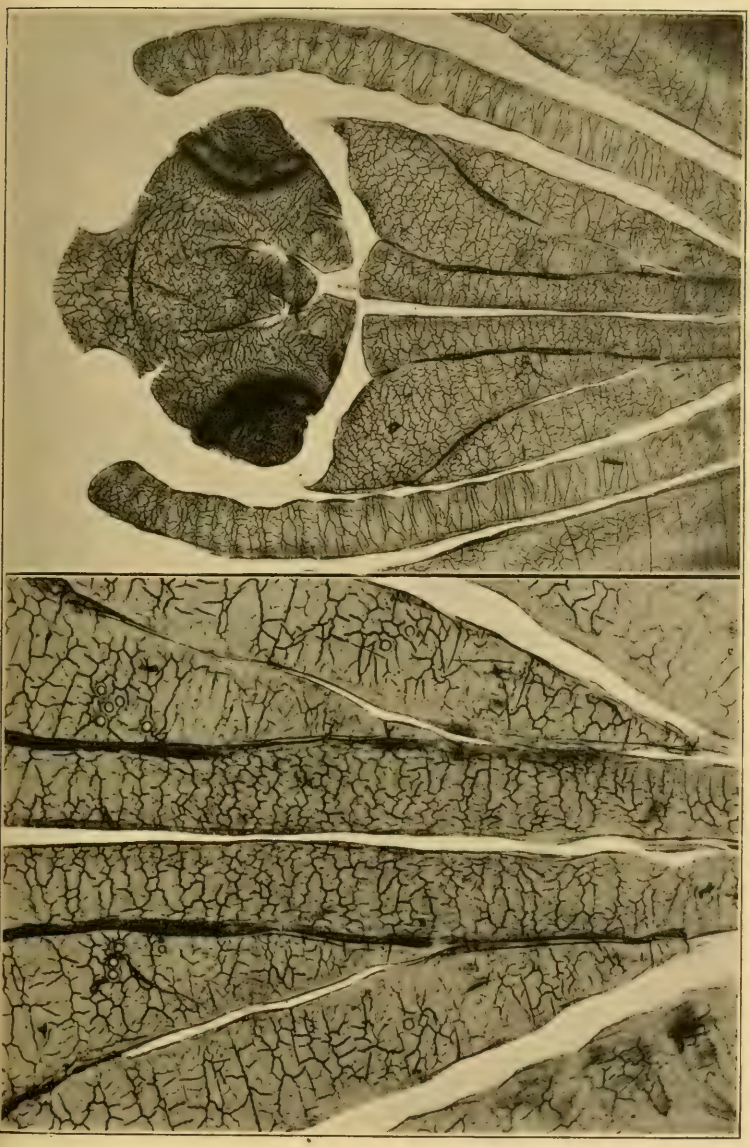
1

2

Photo, F. N. Clark. *C. Hentschel.*

LARVA OF LATIORINA ORBITULUS.

(1) Leaf of *Soldanella* mined by young larva × 4. (2) Pupa case × 6.



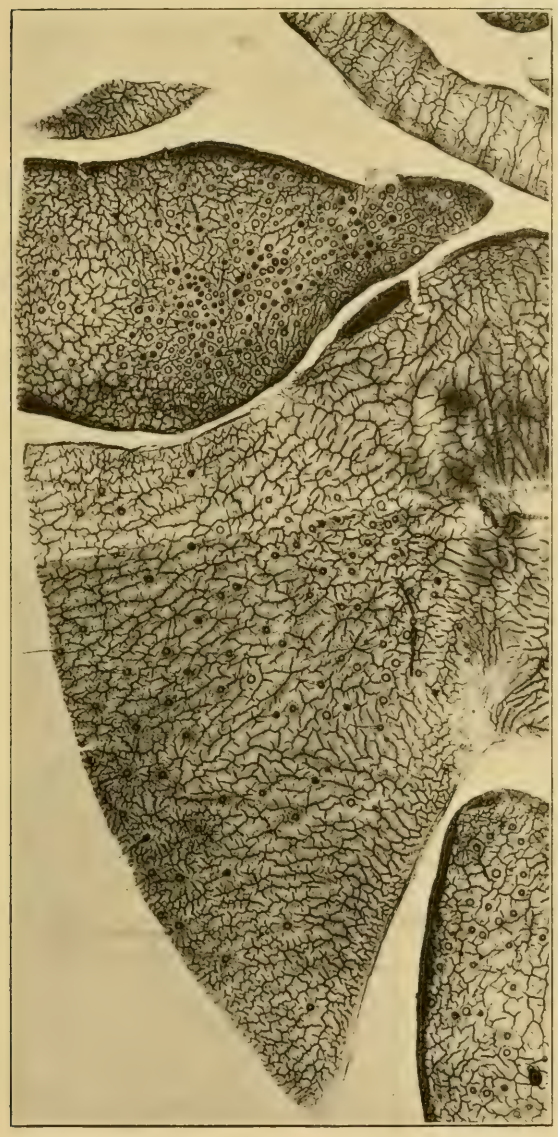
1

2

Photo, F. N. Clark. *C. Hentschel.*

PUPA CASE OF LATIORINA ORBITULUS.

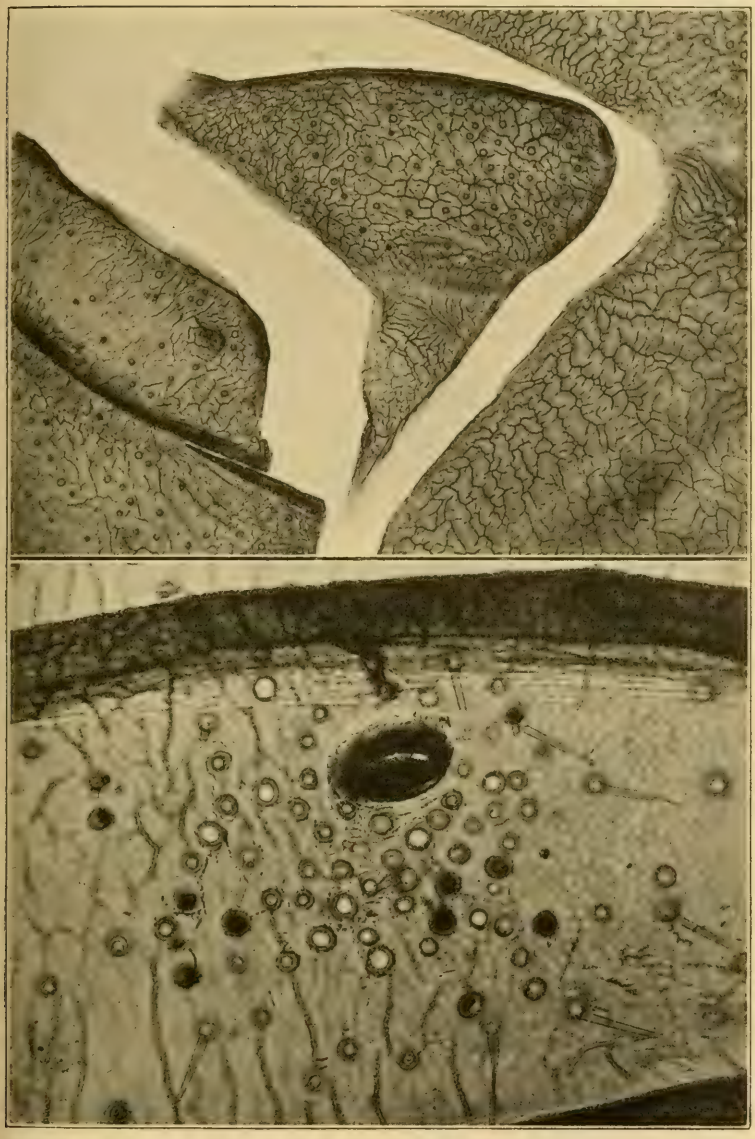
(1) Face and appendage covers × 20. (2) Portion of leg covers, &c. × 50.



Photo, F. N. Clark. *C. Hentschel.*

PUPA CASE OF LATIORINA ORBITULUS.

Dorsal head-piece, &c. × 30.



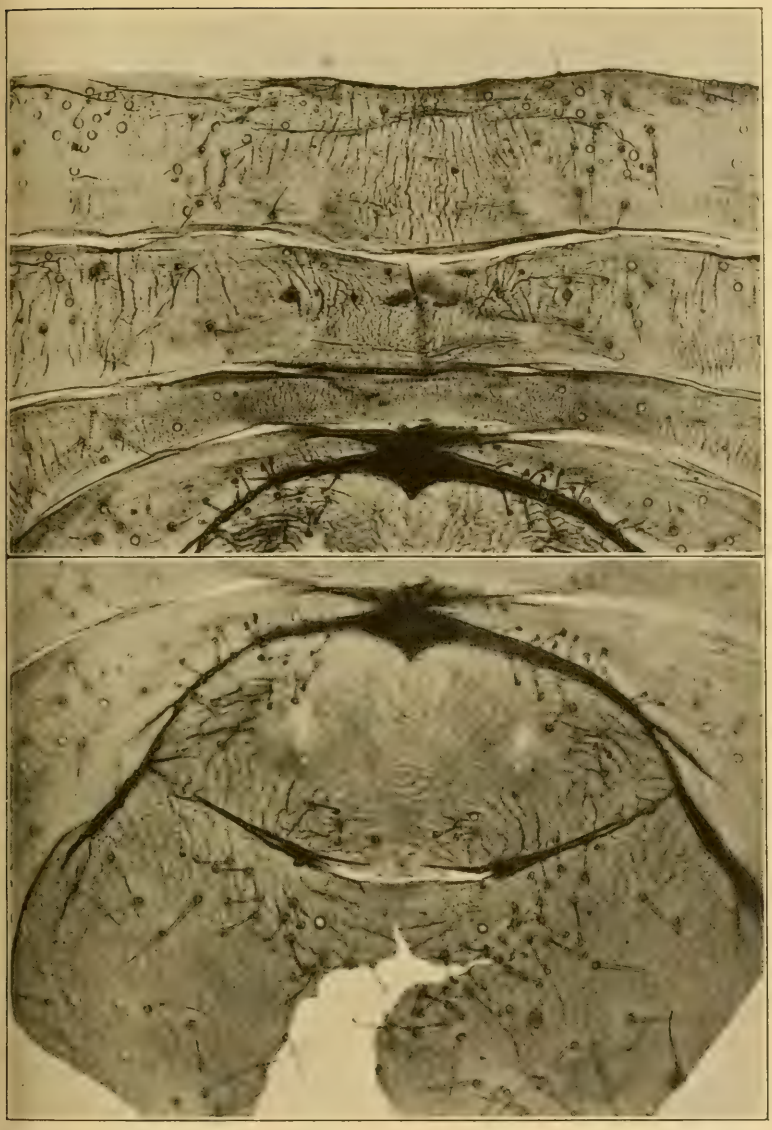
1

2

Photo, F. N. Clark. *C. Hentschel.*

PUPA CASE OF LATIORINA ORBITULUS.

(1) Metathorax, &c. × 30. (2) Fifth abdominal spiracle × 100.



1

2

Photo, F. N. Clark. *C. Hentschel.*

PUPA CASE OF LATIORINA ORBITULUS.

(1) Ventral abdominal segments, 5–9, × 50. (2) Terminal segments, showing cremastral hooks, × 50.

Plate XXIV.

Showing face and appendage covers × 20 and portions of leg covers (and of antenna and wings × 50), to show the lenticles over the tibio-tarsal joints.

Plate XXV.

Shows dorsal head piece, prothorax, and mesothorax (of one side) of pupa × 30.

Plate XXVI.

Shows metathorax (of one side) of pupa with parts of first and second abdominal segments and of mesothorax and wing covers × 30 and the region of the right spiracle of the fifth abdominal segment, with suture 4–5 in front × 100.

Plate XXVII.

Fig. 1. Ventral portions of abdominal segments 5, 6, 7, 8 and 9 × 50.

2. Continues fig. 1 on to dorsum, showing cremastral armature of hooks. Segments 9 and 10 (abdl.) are not here distinguishable × 50.

VIII. *The larva of* Orgyia splendida (dubia). By T. A. Chapman, M.D.

[Read November 16th, 1910.]

Plate XI.

I met with this insect at Cuenca and Tragacete in 1901, and in 1903 found the larvae abundantly at Moncayo, still further to the north. My observations on the species were published in the Ent. Record, XIV (1902), p. 41, and XVI (1904), 195.

Two excellent drawings of the larva, however, by Mr. E. C. Knight, have remained in my drawers from that date unpublished. This seems very unfortunate, and they are better to be printed now than not at all. Their special interest lies in the larva being decidedly different in colouring from Freyer's figure of *dubia* (Taf. 297), from Rambur's figure of *splendida* (Fauna d'Andalusia, Pl. XV, fig. 6*d*) and from Spuler's figure (Nacht., Pl. II, fig. 13); the latter, from some source unknown to me, being most like it.

Moncayo appears to be the most northern habitat of the species, the larvae are more brilliantly coloured, and the imagines have a larger area of orange yellow than the more southern or eastern examples.

The brilliancy of the larva depends on the deep black especially of the tufts, contrasted with the white and red brown rather than black being the ground-colour of other figured larvae of the species. There are other colour-differences, which the figures absolve me from specifying. The species is certainly remarkable for having definite geographical races differing not only in the imago, but also in the larval state.

IX. *New Genera and Species of* Striphnopterygidae *and* Lasiocampidae *in the British Museum.* Described by Chr. Aurivillius.

[Read November 16th, 1910.]

Sir G. F. Hampson some time ago sent me a collection of African *Striphnopterygidae* and *Lasiocampidae* for identification. Among the species contained in the collection the following seem to be new to science.

Figures of the *Lasiocampidae* will be published in my revision of the forms of that group occurring in the African region. I have to thank Sir G. F. Hampson for the figures of the *Striphnopterygidae* here published.

Family STRIPHNOPTERYGIDAE.

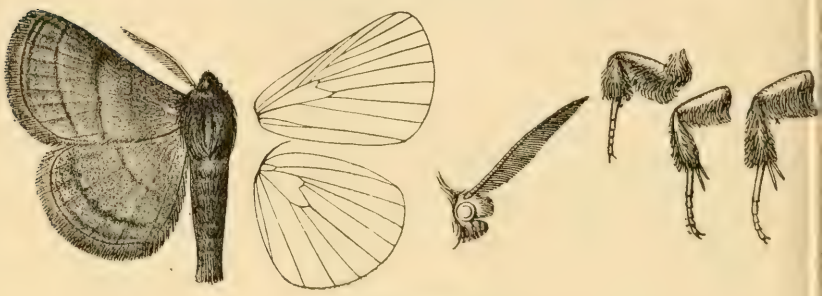
Cyrtojana, nov. gen.

Proboscis aborted. Palpi porrect, hardly reaching beyond the frons, compressed, broadly fringed beneath with hairs, last joint moderately long, obtuse. Antennae reaching well beyond the apex of the cell, broadly bipectinate in the male. Fore tibiae unarmed, hind tibiae with apical spurs only. Abdomen of male reaching a little beyond tornus of hindwing. Wings broad, with the termen strongly and evenly arched; costa of forewing straight, of hindwing slightly curved. Forewing with vein 3 from well before angle of cell, 4 from near angle of cell; lower discocellular long and strongly angled near its upper end; veins 5 and 6 nearly from the same point, well separated from the common stalk of 7, 8, and 9; 10 absent (?), 11 free from the cell close to its apex. Hindwing with vein 3 from well before angle of cell, 4 from near angle; lower discocellular very long, sharply angled near its upper end; middle discocellular very short, veins 5 and 6 nearly from the same point; upper discocellular rather long and oblique; vein 8 connected with the cell by a transverse bar before middle and thereafter closely approximated to the cell.

The genus *Cyrtojana* is very nearly allied to *Janomima*, and seems only to differ by the short and broad form of the wings and the vein 8 of hindwing, which runs close to the cell and is connected with it by a bar.

Cyrtojana trilineata, n. sp.

Fawn coloured, abdomen somewhat paler ; antennae whitish with brown branches; wings above with three curved black lines, the first medial, the second postmedial, the third terminal, postmedial line of forewing on the inner side slightly bordered with whitish, basal



Cyrtojana trilineata ♂ ½.

area of hindwing broadly suffused with yellowish ; cilia unspotted brown ; underside of forewing yellowish-brown without markings, of hindwing with two broadly distant, curved dark brown transverse lines, the area between the lines partly tinged with whitish.

Expanse 53 mm.

PONDOLAND, February 1906 (*H. H. Swinney*). 1 ♂.

Phyllalia alboradiata, n. sp.

Wood-brown ; head, upperside of thorax, and two first dorsal segments of abdomen fuscous brown ; antennal shaft and veins 1–7

Phyllalia alboradiata ♂ ½.

of both wings above broadly whitish ; wings below paler with the veins less distinctly white.

Expanse 53 mm.

CAPE COLONY. 1 ♂.

A very distinct species at once distinguished by the white veins of the upperside. The fore tibiae at apex with a short angulated corneous plate.

Stibolepis novemlineata, n. sp.

Very pale ochreous yellow or yellowish white; branches of antennae and abdomen ochreous brown; forewing above at base with four erect slightly-waved black transverse lines, and in apical half with five such lines, of which the first touches the hind angle of

Stibolepis novemlineata ♂ ♩.

the cell, and the last is larger, slightly oblique and reaches the costa just before apex. Hindwing above with a gently curved subterminal black line, which also is slightly indicated in the forewings. Underside of both wings without markings.

Expanse 53 mm.

Uganda: Musinde (*C. Christy*). 1 ♀.

Phiala patagiata, n. sp.

Collar, frons between the eyes, antennae, palpi, pectus, legs, and abdomen ochre-yellow; vertex whitish; tibiae and tarsi spotted with black; patagia black, fringed with long whitish hairs, sides of pectus also clothed with long whitish hairs. Wings above white; forewing, with the cell, all the interspaces, and a straight, somewhat oblique line behind the middle densely speckled with black scales, the veins only being broadly white; hindwing greyish with white veins and two curved transverse blackish bands, one behind the middle and the other at the termen. Cilia of both wings white, unspotted. Underside dark yellowish-grey without markings.

Expanse 44 mm.

Cape Colony: Deelfontein. 1 ♀.

Easily distinguished by the black, white-fringed patagia, and somewhat resembling Cramer's *Ph. naninia* in the colour and the markings of the wings.

Phiala similis, n. sp.

Frons below and at the sides, palpi, pectus, legs, and abdomen ochre-yellow. Tarsi slightly spotted with fuscous; vertex of head and collar pale yellow; upperside of thorax and wings white; wings

Phiala similis ♀ ½.

above beyond middle with a common series of more or less connected black spots on the veins, but otherwise nearly destitute of black scales; underside of both wings yellowish-white with the series of the upperside faintly indicated.

Expanse 47 mm.

E. Transvaal: White River (*A. T. Cooke*). 1 ♀. Also 1 ♀ from the same locality in Mus. Holmiae.

The species is very nearly allied to *Ph. costipuncta*, H. Sch., and differs almost solely in the series of spots of hindwing beginning exactly opposite the series of the forewing, and not much more distally as in *costipuncta*.

Phasicnecus plagiatus, n. sp.

Nearly allied to *Ph. Preussi*, Auriv., and perhaps only a variety of that species, differing only as follows:—Upperside: the blackish

Phasicnecus plagiatus ♂ ½.

discal lines of forewing nearer together and the area between the lines, except at hindmargin in 1*a* and 1*b* and at costa, entirely filled in with fuscous, the basal half of forewing also more or less infus-

cated in the middle; apical fuscous patch formed as in *Ph. Preussi* but somewhat larger; the antemedial curved line of hindwing obsolete. Underside: antemedial curved line of both wings hardly indicated. Upperside of thorax and palpi fuscous brown.

Expanse 54 mm.

ASHANTI: Coomassie (*H. Whiteside*). 1 ♂.

Family LASIOCAMPIDAE.

Laeliopsis, nov. gen.

Palpi short, not reaching beyond frons. Eyes small, naked (?). Antennae of female bipectinate to tip. Frons without prominence. Fore tibiae short, armed at tip with one long and one very short claw hind tibiae with apical spurs only. Cell of both wings open. Forewing: costa straight to beyond middle, slightly arched near apex; termen and hindmargin curved; vein 3 somewhat nearer to 4 than to 2, 4 and 5 from the same point, 6 free from upper angle of cell, 7 and 8 on a short stalk, 9 and 10 shortly stalked from the middle between 7 and 8 and 11, 11 free. Hindwing: costa nearly straight, termen curved; vein 3 from the middle between 2 and 4, 4 and 5 from the same point, 7 from very near base, 8 shortly anastomosing with 7 and forming a very small pre-costal cell without veinlets. Abdomen of female long, reaching far beyond tornus of hindwing. Body clothed with hairs only.

A very distinct genus, not nearly allied to any other genus known to me.

Laeliopsis punctuligera, n. sp.

Head, thorax, and forewing above ochreous-brown; abdomen, hindwing, above and underside of both wings ochreous-yellow; forewing above with two obsolete fuscous vittae dotted with white, one above vein 1 almost from base, the other above vein 5, both ending at the submarginal dot of the interspace; an irregular submarginal series of 7–8 white dots, finely ringed with fuscous; hindwing behind middle with a transverse series of 6–7 black dots; both wings below paler yellow with a submarginal series of black dots.

Expanse 35 mm.

DELAGOA BAY (*Rev. H. Junod*). 1 ♀.

This peculiar female has the same form of the wings and nearly the same markings as some species of the genus *Laelia*. The male has probably a more Lasiocampid aspect.

Leipoxais emarginata, n. sp.

Yellowish fawn colour; abdomen blackish above at base; branches of antennae fuscous; forewing with costa gently arched, termen strongly waved, dentate at end of vein 7 and 9, hindmargin straight, above with the veins slightly darker than the ground-colour, antemedial and postmedial lines fuscous, nearly straight and even, slightly oblique, parallel and 5 mm. distant from each other; an irregularly curved, waved, fuscous submarginal line, termen rather broadly fuscous-brown between apex and vein 3; forewing below pale yellowish without distinct lines, dark brown at apex as above. Hindwing with the costa very deeply emarginated at middle, and the termen strongly arched and moderately waved; above fawn-coloured, much darker yellowish-brown at costa and with discal transverse lines, which are distinct only at costa; below darker, with the lines more distinct.

Expanse 45 mm.

Transvaal (*C. H. Pead*). 1 ♀.

Easily distinguished from all other known species by the deeply-incised costa of hindwing and the straight discal lines of forewing.

Gastroplakaeis delicatulus, n. sp.

Hoary grey; antennae black, with testaceous branches, tarsi black; abdomen above golden yellow, with narrow black terminal bands to the segments; apical tuft long and pale grey; forewing above pale silvery grey with a black dot at end of cell and narrow antemedial, postmedial, and subterminal fuscous lines; antemedial and postmedial lines double and gently waved; subterminal line obsolete in the middle, distinct near tornus and at apex; cilia very short, brownish between the veins; hindwing above pale grey, darker at termen, with whitish veins, at inner margin broadly tinged with yellow from base to tornus and vein 2; wings below darker, fuscous-grey with whitish veins, forewing whitish in the middle, hindwing yellow at inner margin as above.

Expanse 41 mm.

Gold Coast. 1 ♂.

Resembles *G. meridionalis*, Auriv., but smaller, with fewer lines on the forewing, and the yellow colour of the hindwing less diffused.

Pachypasa trilineata, n. sp.

Wood-brown, vertex, tegulae, and patagia greyish-brown ; abdomen above reddish-brown, forewing above just behind middle, with three (at costa four) strongly-waved blackish transverse lines, which are placed close together and run nearly parallel to the termen ; the third line is distally slightly bordered with pale brown ; a broad, inwardly irregularly dentate terminal band fuscous-brown ; hindmargin also more or less suffused with fuscous; hindwing above reddish-brown without markings ; both wings below dark brown with paler veins and with traces of a darker transverse line ; abdomen with a long fuscous-brown apical tuft.

Expanse 50 mm.

UGANDA : Entebbe. 1 ♂.

Anadiasa affinis, n. sp.

Blackish, head and thorax sprinkled with some few greyish hairs ; branches of antennae pale yellowish ; forewing above fuscous, antemedial line nearly erect, black, double, more or less filled in with greyish, postmedial line also black and double, gently outcurved and filled in with whitish, ending at hindmargin in small whitish patch, which also receives the submarginal line ; this is black, waved and deeply angled inwards between veins 5 and 6; cilia blackish ; forewing below blackish-grey without markings, paler greyish at hindmargin. Hindwing on both sides grey with an irregular black patch near tornus.

Expanse 26 mm.

ORANGE RIVER COLONY : Bloemfontein (*E. Eckersley*). 1 ♂.

Nearly resembling the ♂ of *A. undata,* Kl., but differing in the submarginal line of forewing, being deeply angled near middle, and the larger white patch near tornus of forewing ; the black patch at tornus of hindwing is also more distinct.

X. *Notes on insect enemies in the Tropics and their influence on mimicry.* By E. A. Cockayne, F.L.S., F.E.S.

[Read November 16th, 1910.]

The influences which have caused and continue to act on mimicry in butterflies and other day-flying insects, are now recognised to be different, not only in each country, but in each case of this form of protection; and any observations at first hand which tend to throw light on them are consequently valuable. This must be my excuse for giving you the following scanty and disconnected notes and my reflections on their meaning. I have recently spent six weeks in Ceylon, three in Java, three in Celebes, and four in Japan, and though spending no time in specially looking out for cases of diurnal insects caught by their enemies, I was always on the watch for any obvious one, and noted it down at once. I will first deal with cases of insect enemies which came under my notice, then lizards and birds.

In Ceylon, Java, and Celebes dragonflies were very abundant, but, though they frequently had to turn aside to avoid a collision with a butterfly, they seemed quite indifferent to its proximity.

The only exception was at Kandy in Ceylon, where I saw a small dragonfly, perhaps a *Sympetrum*, capture a small dull brown Hesperid. The dragonfly fell to the earth still holding it, and then let it go. The "skipper" flew up and settled on a leaf, apparently unhurt, but the dragonfly made no attempt to pursue it.

Kershaw (Proc. Ent. Soc. 1905) notices a similar indifference in South China.

In Japan dragonflies were less abundant and butterflies much fewer, both in species and numbers. At Nara I saw a moderate-sized dragonfly carrying a *Mycalesis*, and at Nikko a similar one carrying a specimen of *Satyrus dryas*. I tried to catch the latter and failed, but the dragonfly dropped the butterfly, dead, but uneaten. In both cases the butterfly captured was a Satyrid, and in neither case had the wings been cut off.

Dr. Longstaff, Trans. Ent. Soc., 1905, p. 135, notes the

capture of *Elanaida goschkevetschii*, also a Satyrid, by the dragonfly *Orthetrum japonicum*, Uhler, near Yokohama.

At Miyanoshita, in Japan, I saw a green mantis on a lily flower with a *Papilio maackii*, of which it had eaten the head and half the thorax.

At Kandy, in Ceylon, I saw a large Asilid fly carrying a bright green bug, a protected species. Mr. E. E. Green gave me its name, but I have mislaid the note.

Lizards of the genus *Calotes* are very abundant in Ceylon, especially round Colombo and in the hill districts, but becoming scarcer towards the north of the island. There are several species, of which the green ones are most fond of sitting on tall herbaceous plants or at the ends of twigs on bushes and small trees, the brown ones on tree trunks. All are good climbers and very active, but the green ones, from the nature of their resting-place, are most likely to destroy butterflies. Small-scaled brown ground lizards are also common, but if they catch butterflies, as is probable, it must be chiefly low-flying genera such as Terias or some of the *Lycaenidae* and *Hesperidae*.

The following are my notes:—

Colombo, March 31st, 1910. Saw a green Calotes lizard at the end of a twig on a high hedge of a lilac-flowered shrub, try to catch a large blue-black carpenter bee (*Xylocopa*). It missed the bee, but large numbers of the same species were visiting the flowers, and from its eagerness there is little doubt it was in the habit of eating these insects.

Nowara Eliya, 6500 ft., May 10th. Two specimens of *Euploea asela* were fluttering round a tall Composite plant, near the flowers of which a long-tailed green lizard (*Calotes*) was sitting. The lizard snapped at one but missed, and both flew away. After a short time one returned. Before it settled the lizard jumped and fell further down the plant, but with the head and thorax of the *Euploea* in its mouth.

The butterfly opened its anal tufts, and the lizard, after remaining quiet for a minute or two, began to chew it up, getting it further and further into its mouth. I removed one wing, which I show to-night, but the whole of the rest of the butterfly was devoured, obviously with enjoyment.

The same day at Hakgala I saw two of the shorter-tailed brown lizards, each with a beetle in its mouth, but failed to catch either of them.

Colombo, June 9th. A male *Elymnias fraterna* (*undularis*) was fluttering round a female, which was at rest on a palm leaf about eight feet from the ground. There was a sudden rustle, and a green lizard (*Calotes*) ran along the leaf and snapped at them, but went just between them, and missed both. They at once flew to a higher leaf. Later the same lizard tried to catch a male *E. fraterna*, but never actually had an opportunity. The lizard climbed down the palm towards the butterfly, which was fluttering up and down, and kept altering its poise ready to make a sudden rush, but the butterfly never came quite near enough.

Finding the lizards quite near at hand, I tried to experiment with them, but unfortunately had only two days of showery weather before leaving the island, and material was scarce. I caught a fine *Papilio aristolochiae*, and, giving the fore-wing a twist near the base, offered it to the lizard at the end of a stick. It moved, and the lizard rushed forward and knocked it off the stick in its eagerness for a meal. The butterfly flew away, and I could not procure a second.

Colombo, June 10th. Caught two females of *E. fraterna*, which in this sex mimics *Danais plexippus* in its colour and slow flight in the open; the male, dark brown in colour, is much more active, but rarely ventures far from its food-plant, the palm.

I put one on a palm leaf near a lizard, where it remained still for twenty minutes before it flew off; and although it was in full view of the lizard, it was left unmolested. The second, which I treated in the same way, at once began to flutter, and the lizard eagerly dashed at it, but missed, and ran away to hide.

To another lizard (*Calotes*) I offered a specimen of *Telchinia violae*, a distasteful species, on the end of a stick. It slowly opened and closed its wings. The lizard saw it at once, and, after poising itself, rushed forward, caught the butterfly by the head and thorax, and rapidly ate it all, including the wings, chewing it with gusto. Later I saw a male *E. fraterna* resting in full view of and very near a lizard, but it never moved, and was left untouched.

The above observations bring out two or three interesting points. One is that so long as a butterfly remains still it is let alone, but is attacked as soon as it moves.

Hence the wounds inflicted are very unlikely to be symmetrical, but are more likely to take the form of large pieces removed from one side only—a kind of injury I often met with in *E. fraterna*. Symmetrical injuries are most probably caused by the ground lizards.

The second point is that, of the species I saw attacked, so many are either distasteful, and in some cases models for mimicry, or are mimics of distasteful species.

Xylocopa, a model.

Euploea asela, distasteful and a model.

Telchinia violae, a distasteful *Acraeine*.

Papilio aristolochiae, a distasteful Papilio and a model for one of the forms of female of *P. polytes*.

Elymnias fraterna, of which the ♀ is a mimic of *D. plexippus* or *chrysippus*.

The last case is discounted by the fact that the lizards experimented on probably fed chiefly on this species, and may never have met with its models.

Though very incomplete, these observations seem to show that the green species of *Calotes* will eat any insect, even those belonging to distasteful or protected groups. And it is a great pity I could not continue these experiments on wild lizards, which, though they required a good deal of patience, were comparatively easy.

I have noticed no other records of notes on these lizards except that Kershaw (Trans. Ent. Soc. 1905, p. 5) says *Calotes versicolor* destroys great numbers of butterflies at Hong Kong, as they visit *Lantana* flowers, but mentions *Hesperidae* as their chief prey, and does not give an instance of a *Danaid* or *Euploea* being attacked, though both often visit *Lantana* there.

At Miyanoshita, Japan, I saw a large black "swallow-tail," *Papilio macilentus*, caught by a small ground lizard allied to the Ceylon species.

Ground lizards (*Lacerta*, etc.) appear to be by no means indiscriminate in their choice of food.

Poulton ("Colours of Animals"), Marshall (Trans. Ent. Soc. 1902, pp. 339, 435), Rosenberg (Proc. Ent. Soc. 1909, pp. lx–lxii) says that in S. America they eat many butterflies, *Callidryas*, *Nymphalinae*, and *Papilio*, but mentions no distasteful species.

Thus *Lacerta* and other ground lizards may influence mimicry favourably in some countries, though Marshall thinks it has little influence in S. Africa, while *Calotes*

probably influences it unfavourably by destroying protected species or their mimics, which, owing to their slow flight, may fall victims in numbers out of proportion to those of the swifter unprotected species.

In birds I saw little positive evidence that they prey on butterflies, but it was quite obvious they were unwilling to chase butterflies flying actively in the sunshine. I often saw one almost touch the head of a drongo and yet never saw one attacked.

On March 31st, at Colombo, I saw a Syntomid, one of a family usually considered distasteful, caught on the wing and eaten by a sparrow; and on April 12th at Haragáma, Ceylon, a sparrow chased an *Appias paulina*, but soon gave up.

On June 10th, at Colombo, a magpie-robin ate a female *Elymnias fraterna*, which I had been offering to a lizard, and which fluttered on to the ground. Its resemblance to *D. chrysippus*, or *plexippus*, did not save it. The evidence of birds attacking butterflies collected by Marshall and others is too strong to be disregarded, and one cannot help thinking they are a very strong influence at work in causing and improving many of the wonderful examples of mimicry now so well known.

XI. *The Hybernation of* Vanessa atalanta *in Captivity.*

By L. W. Newman, F.E.S.

[Read December 7th, 1910.]

In the autumn of 1909 I saved seven specimens of *Vanessa atalanta* to see if it were possible to hybernate them in England under unnatural conditions.

I have many times tried them out of doors, also in a cold greenhouse, but in both cases failed, the specimens dying off early in the winter.

I prepared a small cardboard box about 9 by 6 by 6 inches deep, cut out the lid, leaving only the frame of cardboard, stretched mosquito netting over box and held this down with the cardboard frame.

The butterflies were placed in this and the box stood by a window facing east, and at night removed to a warmer quarter of the room; there was always a fire in my room and also a large boiler which was warm all night, so that the specimens never had a lower temperature than, say, 35 degrees even on the coldest nights.

After two or three days they became very restless and evidently required food. I well soaked a good-size piece of absorbent cotton-wool in water and sprinkled cane sugar on it; this I placed in the centre of the box on the top of the mosquito netting; very soon their tongues had found the sweets and they were busy feeding; they walked about in the box, continuously opening their wings when the sun was shining, and about midday retired to the darkest corner of the box.

Throughout the whole winter they fed regularly every few days, and on no day when there was any sun did they remain quiet, no matter how cold it was out of doors.

The first casualty happened in December, when a specimen became quite paralyzed; he seemed to have indulged too freely in food, for his body became very much distended, and he lay for many hours at the bottom of the box with legs twitching and wings quivering before he died.

In January the specimens became very tame, and it was my habit to let them fly about in my room on sunny

mornings; they would settle on the curtains with wings expanded and sun themselves; they would also feed from my hand, and enjoyed a piece of apple with sugar sprinkled on it, or a banana; they seemed to like the extra space, and the exercise, I thought, would keep them strong, as they took so much food.

In February I lost a second specimen, which flew into the fire; this left me with only five. All went well, and no more met with unhappy endings.

Early in March I placed them during the day out of doors in a roomy cage under a glass-roofed house with open sides and gave them a pot of growing nettles; no sign of pairings took place, but in early May a fair quantity of ova were deposited; these, however, proved to be infertile, and, on examining the specimens, I found all were ♀♀, the only ♂♂ having been the victims of the winter; this greatly disappointed me.

The last specimen lived till the end of May.

I think these observations clear up a point which has long been in doubt, and prove that *V. atalanta* is not a true hybernator, and requires food all the winter, and that very seldom, if ever, they pass the winter as imagines in England; we are therefore entirely dependent on immigration every year for this beautiful, though common, butterfly. 1910 has been a very bad "*Atalanta*" year. I have seen, personally, only two specimens on the wing, and found one larva, and have heard of very few larvae or imagines being seen in England this year.

I had six pupae sent to me from Devonshire; these I bred out, and have the imagines alive. Mr. T. Reuss has sent me eight living specimens, two of which met with an accident a few days after arrival, so this winter I have twelve specimens, and with these few I hope to be able to clear up a further point next year, and that is to find out whether the species pairs in the spring. I have noticed no sign of autumnal pairings.

XII. *Further Observations on Temporary Social Parasitism and Slavery in Ants.* By HORACE ST. J. K. DONISTHORPE, F.Z.S.

[Read December 7th, 1910.]

THIS year I have been able to make a few more observations and experiments on Temporary Social Parasitism and Slavery in Ants, both in nature and in my observation nests. In my two previous papers (Nos. 39 and 42) I have explained how the queens of ants of the *Formica rufa* group found their colonies in a nest of *Formica fusca* and its races. It may, however, be as well to briefly recapitulate these facts when dealing with the different species referred to in this paper, giving at the same time my new notes and observations. I do not deal here with colonies founded by branch nests, or by queens accepted back into their own, or other nests of the same species, but only when a queen, after her marriage flight, has entered a nest of another species.

Formica rufa, L.—When a queen of this species has found a new, or weak, or perhaps a queenless nest of *F. fusca*, she enters it after some fighting with the workers and is eventually accepted by them. When her eggs are laid, the brood is brought up with the help of the *fusca* workers, the *rufa* queen thus becoming a temporary social parasite, as when the *fusca* workers die off a pure *rufa* nest will remain. It is probable that the *rufa* queen kills the *fusca* queen if present. On May 15th I visited Parkhurst Forest, I. of W., in company with Mr. Taylor of Sandown. We noticed several *rufa* ♀♀ at large, some with wings and others deälated. (It is probable there had been a marriage flight. I have never seen a marriage flight of this species, but Wasmann, who has, notes that it occurs from the middle of April onwards.) One of the latter we observed near the entrance to a *fusca* nest. That is to say, there were several entrances into the ground in a sandy corner, from whence *fusca* ☿☿ kept coming in and going out. We watched the *rufa* ♀ for a long time; she made overtures to the ☿☿, and endeavoured to enter their

nest. She had several fights with some of them, rolling over and over together on the ground. She eventually beat them off, or drove the more persistent ones away. Her behaviour was just such as I have observed in my observation nests at home when I have introduced *rufa* ♀♀ into *fusca* nests. Finally she entered one of the doors of the *fusca* nest, and we saw no more of her. In my paper on the Founding of Ants' Nests (No. 42), I describe how a *rufa* ♀ from Nethy Bridge was accepted by ☿☿ of *F. rufibarbis* var. *fusco-rufibarbis* from Whitsand Bay, and in conclusion I write: "It is, therefore, quite clear that if this ♀ will lay eggs the larvae will be brought up by these strange ☿☿." This was written on February 24th. On March 7th she began to lay eggs, and by April 14th four bunches of eggs had been produced. These were carried about by the ☿☿ in their jaws. On May 1st all the eggs had hatched, some of the larvae being quite large, and they were fed and attended to by the ☿☿. On June 1st many of the larvae had changed to naked pupae. (Though the pupae of *Formica* are generally enclosed in cocoons, the so-called "ants' eggs" of bird fanciers and pheasant breeders, the first brood of a young queen is often naked. I have found naked pupae in a nest of *F. fusca* at Porlock, etc., and F. Smith recorded similar cases at Water's Meet and other places (Ent. Ann. 1871, p. 59).) All the larvae changed to pupae, but only two spun cocoons. By June 20th some of the pupae had reached the imaginal instar. All eventually became perfect insects, but were weak and unable to walk alone and some were cripples, and they died after a few days. The ☿☿ carried them about and attended to them, but I do not think they freed them thoroughly from the pupal skin. This may be because there were not enough ☿☿ to see to them properly, only about twenty-five being present. All the young *rufa* ☿☿ were very small, this being generally the case with a young queen's first brood. They were carried about even after death, and then thrown on the ants' rubbish heap. I have mounted some of them on card. The queen has just commenced to lay again. A few eggs appeared on November 20th. These were carried about by one of the ☿, and on the 23rd they were on the top of the ♀'s abdomen, where they had been placed during the night. To-day, November 26th, there is quite a large bunch of eggs, which is carried about by two of the ☿☿.

On April 2nd I brought up from Darenth Wood some *fusca* ☿☿ and 3 ♀♀, which I had dug up out of a small sandy bank. These I fixed up in a "Crawley" nest. On April 17th I introduced a *rufa* ♀, taken at Wellington College on 16th, into the last compartment (the fourth) of the nest. The *fuscas* were in the second compartment. In the morning of April 18th, the *rufa* ♀ was in the first compartment with 3 *fusca* ☿☿ and was not being attacked. She must have passed through the *fusca* nest during the night. During the day she was attacked by three other ☿☿ who entered her compartment. She was not at all aggressive, and tried to conciliate them by stroking them with her antennae. Two of them left her alone after a time, but the third held her by the front leg for the greater part of the day. Another ☿ tried to drag her into the second compartment, and eventually she went in and was accepted by the *fuscas*, remaining with them. On June 1st one of the *fusca* ♀♀ was dead, bitten in two! This was probably the work of the *rufa* ♀; she often sat with her head over one or the other of the three *fusca* ♀♀. On June 20th the *rufa* ♀ unfortunately died. Eggs had been laid, but whether by the *rufa* ♀, or the *fusca* ♀♀ alone, or by both species, I am unable to say. Many of the ☿☿ died during the summer, and on July 20th only 3 ☿☿ remained with the 2 *fusca* ♀♀. Seven larvae and two pupae in cocoons were present. The *fusca* ♀♀ helped to carry about the larvae and pupae. All the dead remains of the *fusca* ☿☿ and rubbish had been carried into the first compartment, but the abdomen of the dead *rufa* ♀ was always carried about by one of the ☿☿, and placed with the pupae. Two more of the *fusca* ☿☿ and the larvae and pupae died. To-day, November 26th, the one *fusca* ☿ and the 2 ♀♀ are still alive. This ☿ sits apart from the 2 ♀♀, and always carries the abdomen of the *rufa* ♀ in her jaws!

On August 21st, Mr. Taylor and I again visited Parkhurst Forest. During the day we found a very small *rufa* nest in an enclosure of young fir trees. It consisted of a small mound, only 8 or 9 inches in diameter and about 3 inches high, but built of *rufa* materials in the usual way. It was quite evident that this was a new nest, so I decided to dig it up and investigate the contents. The nest reached a depth of about only six inches into the earth. It contained about 150 *rufa* ☿☿, most of them very

small, a *rufa* ♀, some 50 *fusca* ☿☿, and a number of cocoons. The whole of the nest was most carefully dug up and examined, but no trace of a *fusca* ♀ could be found. It is quite certain that this was originally a *fusca* nest, which had been entered by a *rufa* ♀. I took home the ♀, a number of *rufa* ☿☿, cocoons, and all the *fusca* ☿☿ we could catch. The cocoons have all since hatched and have proved to be *rufa* ☿☿.

Formica sanguinea, Ltr.—This is the robber-ant, our only slave-making species. The method adopted by the queen of this species is somewhat different to that of *F. rufa*. Having selected her *fusca* nest, she kills and drives away the workers and steals the *fusca* cocoons. These she collects and sits on, and when hatched they bring up her brood. I obtained two successful experiments with *sanguinea* queens introduced into *fusca* observation nests which I have described in a former paper (No. 39). The mixed character of the nest is kept up by slave raids undertaken by the *sanguinea* workers on other *fusca* nests. I was fortunate enough to witness such a slave raid in nature at Bewdley last year. This year I instituted two mimic slave raids in my *sanguinea* observation nest. I obtained a ♀ and a number of ☿ ☿ from a *sanguinea* nest at Woking on April 19th, and placed them in a "Crawley" nest. On June 20th I placed some *fusca* ☿ ☿ and a number of cocoons, which I had brought back from Braemar, in the last compartment of the nest. The *sanguineas* were in the first compartment. As soon as the latter became aware of the presence of the *fusca* pupae, they hurried in, attacked and killed the *fusca* ☿ ☿, and carried off all the cocoons to their own compartment. A similar result was obtained with a number of *fusca* cocoons and some ☿ ☿ I sent up in August from a nest in Parkhurst Forest. My friend Dr. Nicholson introduced them into my *sanguinea* nest for me. All these pupae have hatched, the *sanguinea* ☿ ☿ helped them out of their cocoons, and my nest now contains a large number of slaves, which are quite at home with their masters. I may mention here that it has been stated that the slave-makers only collect the worker pupae of *fusca*, and never the male and female cocoons. Darwin writes: "Males and fertile females of the slave species (*F. fusca*) are found only in their proper communities, and have never been observed in the nests of *F. sanguinea*."

This we now know is not always the case. Morice recorded the capture of four ♂ ♂ and two winged ♀ ♀ in a nest of *Formica sanguinea* at Weybridge on July 13th 1900, and Barnes found four deälated and one winged *fusca* ♀ in a nest of *sanguinea* at Wellington College on September 6th, 1902.

To again test the fact that *sanguinea* ♀ ♀ are unable to found colonies by themselves, I isolated a number of ♀ ♀ obtained at Woking in April. They were placed in bowls of damp sand, with pieces of damp sponge for them to shelter under. They hid under the sponges, but never attempted to dig a cell. A few eggs were scattered about on the surface of the sand, which never hatched. The ♀ ♀ paid no attention to these eggs, and eventually all the queens died. Viehmeyer has proposed yet another method of colony founding. He suggests that a ♀ of *sanguinea* when ready to lay may seek a *fusca* ♀ in the same condition, and both lay together. When the *fusca* brood reaches the pupal stage, the *sanguinea* ♀ takes possession of them. This will account for new nests found in which the *sanguinea* ☿ ☿ are as old, or older, than the *fusca* ☿ ☿.

If Darwin had known, as we know to-day, that the queen *sanguinea* does not herself found her colony, but from the very first steals the *fusca* pupae, one of his greatest difficulties would have been removed, viz. the attempt to understand how it is that the workers which do not breed inherit the slave-making instinct.

Formica exsecta, Nyl.—The queens of this species also found their colonies in nests of *F. fusca*. They are much smaller in comparison to their workers than are those of *rufa* or *sanguinea*, and are also of a darker colour. They can thus more easily get accepted by the fusca ☿ ☿, as Wheeler showed to be the case with the small ♀ ♀ of *F. consocians* with ☿ ☿ of *F. incerta* in America. On May 27th, in company with Mr. Banks of Corfe Castle, I found a small nest of *F. exsecta* at Bournemouth. It was of the usual *exsecta* type, but quite small. On being examined it proved to contain both *exsecta* and *fusca*. The ☿ ☿ of the latter, however, were present in considerably greater numbers than those of the former. Here undoubtedly was a new *exsecta* nest, founded by a young ♀ of that ant, which had entered a *fusca* nest and been accepted by them. None of the larger and older nests of *exsecta*

which I dug up in the same neighbourhood contained any *fusca* ☿ ☿.

We now come to the *Lasius* group. The queens of *Lasius niger*, *alienus*, and *flavus* found their own colonies in the method originally attributed to all ants. That is to say, the queen after her marriage flight removes her wings, and, finding a suitable spot, lays her eggs and brings up her own brood. I have often found queens of at least two of these species under such circumstances in nature. This, however, is not the case with our other two species, *L. umbratus* and *L. fuliginosus*. In both instances the ♀ is smaller in comparison to her ☿ ☿ than is the case with *L. niger* and *flavus*, etc.

Lasius umbratus, Nyl.—It is exceedingly probable that the *umbratus* ♀ founds her colonies in nests of *L. niger*. Wasmann has found mixed nests of these two species which could only be explained by this hypothesis. Crawley's very valuable experiments have proved that the ☿ ☿ of *niger* will readily accept ♀ ♀ of *umbratus*. *L. niger* is a very common and widely-distributed ant; *umbratus* is decidedly scarce, though widely distributed, and more than one colony is seldom found in one spot. It is perhaps worth while to mention that Barnes recorded finding nine deälated ♀ ♀ of *umbratus* in a nest of *F. sanguinea* at Wellington College. I have on several occasions found many *umbratus* ☿ ☿ in company with *F. sanguinea* at Woking. These, however, may not have really been living together. As Wasmann points out in his paper on mixed *Lasius* nests, species may be found which are apparently mixed, but which when confined in a box attack and kill each other. This, of course, is never the case with truly mixed nests.

Lasius fuliginosus, Ltr.—This ant often founds new colonies by branch nests, as in the *F. rufa* group. This accounts for the fact that in a district where *fuliginosus* occurs, so many colonies are often to be found. The ♀, however, is unable to found her own colony. She enters a nest of *L. umbratus* and is accepted by the workers. This is a case of hyper- (temporary) social parasitism, as we have just seen that *umbratus* founds its colonies with *niger*. Recent writings of Crawley, Emery, Forel, Lannoy, Wasmann, and Wheeler all substantiate this fact. Workers of *umbratus* have been frequently found in nests of *fuliginosus*; these would be all that were left of the original

stock of the *umbratus* nest in which the *fuliginosus* queen had founded her colony. It is probable that the *umbratus* ♀ is killed, either by the *fuliginosus* ♀, or by her own ☿ ☿, and thus a pure *fuliginosus* nest will be the final result. I am able to add two facts to the above observations. In June 1897 I found a large nest of *Lasius fuliginosus* in a hollow tree at Lymington Salterns, which contained a number of *L. umbratus* ☿ ☿, both species coming in and going out together. I unfortunately recorded the *umbratus* as *flavus* at the time. On September 20th, 1900, Mr. Tuck sent me a specimen of *L. umbratus* (☿) to name, which he had taken in a nest of *fuliginosus* in an old horse-chestnut stump at Bury St. Edmunds. He naturally suggested at the time that the ant had no business to be there.

My friend Mr. Crawley and I intend to carry out experiments with *fuliginosus* ♀ ♀ and observation nest of *umbratus* next year.

For the benefit of those who wish to study the history and the gradual development of all the facts contained in this paper, I append a list of all such papers and writings as I have been able to read myself on the subject :—

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(42) "On the founding of nests of Ants." Ent. Record XXII, 1910, pp. 82–85.

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XIII. *Two new species of* Lycaenopsis *from Borneo (Sarawak).* By Dr. T. A. Chapman.

[Read December 7th, 1910.]

Plate XXVIII.

The two species here described appear to be new, as I find no descriptions that will apply to them. The photographs of the insects and those of the male appendages will make it easy to recognise the insect with none of the doubt that pertains to some descriptions in this genus. I append descriptions rather out of deference to custom than as of necessity.

The butterflies were accompanied by a specimen labelled *nigerrimus*, R.S., unfortunately without an abdomen, and a female example of apparently another new species. As it was of course impossible to examine the male appendages of these species, I say nothing further about them.

Lycaenopsis moultoni, n.sp. (Plate XXVIII, figs. 5, 6, 7.)

Rather brilliant *bochus*-like blue with a broad black border along costa and round hind margins, 3 mm. wide from apex and 1·2 mm. round margin—dead black in one specimen, in the other each space round hindwing is faintly paler with a dark spot or line in it centrally; no discal line or other mark; fringe dark at base, whitish at edge. Beneath, greyish white, spots faintly darker, except two costal spots and three towards anal angle of hindwing, black, all margined or ringed paler. Discal lines in both wings. Postdiscal row of forewing forms a nearly continuous line, except a break inwards of fourth spot from third on vein 4. Hindwing, basal row of spots present, one costal and one in cell; postdiscal row, costal, large black, 2nd below it or rather basal to it; 3rd and 4th much further out, 5th a little basal to these, but nearly in line; 6th black, more basal, and 8th nearly as much so, 7th rather far out, these three large and conspicuous.

The margin presents fringe brownish with white line at base, then a black line round wing margin, a little way in a not very dark line is arched inwards over each space, leaving a pale patch with a central nearly black mark straight on its outer margin,

arched on its basal side—a bright white line round eyes; palpi black with long white scaling beneath; antennae black with extremely narrow white rings at joints. Exp. al. 24 mm.—very small for a *Lycaenopsis*, and with a rather acute apex, like *matanga*.

The appendages have large rounded dorsal pieces and unarmed clasps, not altogether unlike those of *ceyx* or *plauta*, a form apparently usual with the more southern species of the group and not dissimilar to those of *Megisba malaya*, which is certainly very close to *Lycaenopsis*.

The clasps are long, rounded at ends, and constricted in middle, almost dumb-bell-shaped, again suggestive rather of *M. malaya* than the more typical Lycaenopsids.

The *aedoeagus* is rather shorter and stouter than that of *L. matanga*, but otherwise of similar structure.

Two specimens ♂♂, Sarawak Museum, labelled Matang Road, 7, 3, 10 (type), and Matang Road, December 29th, 1909.

I understand that one of these specimens will be placed in B.M., South Kensington.

Lycaenopsis matanga, n. sp. (Plate XXVIII, figs. 1,2,3,4.)

Upper surface dark (black-brown) with a darker line at end of cell, in one specimen, hardly in the other; on the upperwing is an area of blue, rather violet in one specimen, greenish in the other, from the cell to inner margin, extending upwards beyond the cell, leaving a black margin 4 mm. wide at tornus, 3 mm. wide at vein 4. In one specimen it is a little more restricted, in the other it has a faint extension over the lower margin of the cell. In the hindwing there is a slight central tint in one specimen, in the other the blue extends to 7 mm. from base and is 4 mm. across.

Underside white, fringes with outer half paler, with a smoky tint along costa and hindmargin of forewing, in one specimen involving most of the wing. Underside has little marking under forewing (not altogether from poor condition) in one specimen, in the other is a discal line (dark with white margin) and the post-discal series of spots (cinereous with white borders) consists of 6 spots, the first four in a slightly curved line, the third askew, as in *puspa*, the fifth is set in abruptly from the 4th and is in a straight line with the sixth, both being somewhat linear, pointing to costal end of first spot. Within the dark fringe is a white line, then a dark one, a paler spot (in each space) and an arched spot; the dark lines (or spots) are weakly marked, and outline the marginal eyespots. The hindwing has the costal and discal spots of the usual transverse basal set, the

costal one marked; still larger is the costal spot of the postdiscal series, in the space below it the faint 2nd spot; below this, further out, the next four in a curved row, the second a little oblique, the fourth larger; the 7th lies further out (in space 1–2) and the 8th further in again level with 6th; 6, 7 and 8 larger and darker, but not so dark as first, 7th kidney-shaped, hilum towards base of wing, a discal line longer and plainer than on forewing. The marginal marking of the hindwing is the dark line of fringe and an inner somewhat sinuous line (curved inwards in the spaces) with a dark mark in each space between the two lines.

A narrow white ring round eyes, antennae dark brown (black?) with very narrow white rings, less narrow basally. Exp. al. 32–36 mm.

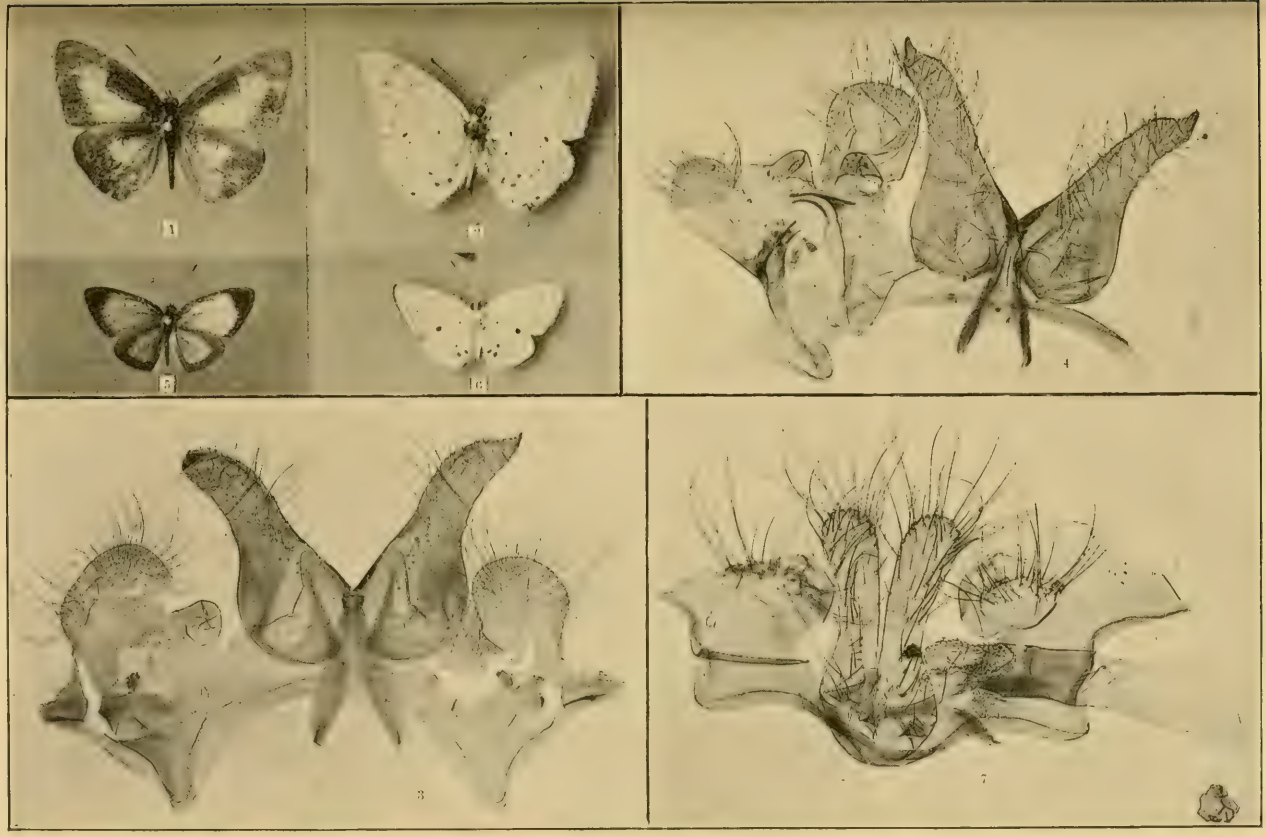
The wing apex is rather more pointed than in many Lycaenopsids. The appendages belong to the group that have no teeth on the clasps, such as *plauta* and *ceyx*, and to which many of the more southern insular forms such as *melaena* and *tenella* approach. The pointed clasp suggests *albocoerulea*, but the full rounded dorsal pieces are very different. It is very distinct from any other form I have examined. The *aedoeagus*, unfortunately outside the photographed area in the plates, is long, 1 mm., rather slender, not quite cylindrical, but rather bulbous basally, but less so than usual in Lycaenopsids, and with hardly any of the common angulation, the portion beyond the floor, about $\frac{1}{6}$ of total length, has three more chitinised lines, one of these forming the style twice as long as the others, the *vesica* (Pierce) very finely spiculated. Altogether somewhat similar to that of *albocoeruleus*.

Two ♂♂, Sarawak Museum, labelled Matang, February 1902, No. 13 (type), and Kuching, January 1898 (4).

One, I understand, is to be placed in B.M., South Kensington.

Description of Plate XXVIII.

Fig. 1. *Lycaenopsis matanga* upper side.
2. „ „ under „
3. „ „ appendages × 40.
4. „ „ „ another specimen × 40.
5. „ *moultoni* upper side.
6. „ „ under „
7. „ „ appendages × 60.



NEW SPECIES OF LYCAENOPSIS.

C. Hentschel.

XIV. *Description of a new Nymphaline Butterfly from British India.* By Hamilton H. Druce, F.L.S., etc.

[Read December 7th, 1910.]

Plate XXIX.

Genus Parhestina.

Parhestina, Moore Lep. Ind., vol. iii, p. 34, 1896.

Parhestina jermyni, n. sp.

♂. Upperside greenish-white with the veins broadly and increasingly black to the termen, which is narrowly and evenly black. In the forewing, cells 3, 4, 5 and 6 are dusted with black scales beyond their middle, thus causing a terminal row of 5 elongate oval greenish-white spots. A few black scales are scattered about the end of the cell, at the base of vein 3, and towards the middle of cell 1. The dorsum is very narrowly black. In the hindwing the dorsum to vein 1 is slightly washed with pale yellow. Underside as above, but paler, with the costal margin of the forewing and all the cells of the hindwing washed with pale yellow, deepest at the base of the costal margin and the dorsum of the hindwing. Antennae black, head, thorax, abdomen above and legs clothed with whitish hairs, abdomen below pale yellow.

Expanse 92 mm.

Hab. Tons Valley, Central Himalayas (4000–7000 ft.).

This remarkable insect, two specimens of which were captured by Colonel T. Jermyn in June, belongs to a section of the genus of which very few examples are known, seems to be the most nearly allied to *P. mena*, Moore (Ann. Nat. Hist. 1858, p. 48, Lep. Ind., vol. iii, p. 36, pl. 202, ff. 1, 1*a*), which was described from an unknown locality, but has since been found at Hong Kong by Mr. J. J. Walker and placed in the British Museum.

P. nicevillei, Moore, from Chumba, N.W. Himalayas, is another allied form (Lep. Ind., vol. iii, p. 37, pl. 202, ff. 2, 2*a*), and a reference to these figures will show that we have here quite a different insect. Colonel Jermyn writes that

he captured one specimen at about 4000 ft. and the other at 7000 ft. The first was taken with a number of very pale specimens of the Pierine *Aporia agathon*, Gray, var. *phryxe*, Boisd., which it closely resembles. The second was flying about alone, its flight being distinctly Nymphaline and noticeably different, *i. e.* stronger and bolder, to the *Aporias*.

With regard to the flight of *P. nicevillei*, de Nicéville wrote that it had a slow and sailing mode, and in general appearance much resembled *A. agathon*, var. *caphusa*, Moore, but does not state whether he found it in company with or only in the same district as the *Aporias*.

The River Tons is a tributary of the Jumna, near its source.

The type will be placed in the British Museum.

Leech has also recorded *P. mena*, from W. China (Butt. China, i, p. 144).

Explanation of Plate XXIX.

Fig. 1. *Parhestina jermyni*, Druce.
2. *Aporia agathon*, Gray, var. *phryxe*, Bdv.

June 21, 1911.

1

2

C. Hentschel.

1. Parhestina jermyni.
2. Aporia agathon, var. phryxe.

XV. *New and Unrecorded Species of* Lepidoptera Heterocera *from Japan.* By A. E. Wileman, F.E.S.

[Read October 19th, 1910.]

Plates XXX, XXXI.

The new and unrecorded species enumerated in this paper are contained in a collection of over two thousand species (inclusive of Micro-lepidoptera) made by my Japanese collector, Mr. Uehara, and myself during a period of eleven years from the year 1892 to 1903. During this period we both made numerous excursions to various localities situated in the four great islands of Japan, namely, Hondo (or Honshū), Shikoku, Kyūshū and Yezo (or the Hokkaidō), and we also did a great deal of collecting at all the various ports at which I have resided, Tōkyo, Yokohama, Kōbe and Hakodate, the first three of which are situated in the island of Hondo and the last named in Yezo. I also received welcome assistance from the Rev. W. Andrews, of Hakodate, and Mr. Nawa, of Gifu, both of whom kindly presented me on several occasions with specimens of Japanese Heterocera.

The provinces worked by us during these eleven years include those of Jōshū, Shinshū, Shimotsuke, Sagami, Musashi, Yamashiro, Settsu, Yamato, and Kishū, all of which are situated in the island of Hondo; the provinces of Tosa, Iyo, Awa and Sanuki, which comprise the whole of the island of Shikoku; the provinces of Bungo, Buzen, Higo, Hyūga, Satsuma and Ōsumi, which are six of the nine provinces composing the island of Kyūshū, and the provinces of Oshima and Ishikari in the island of Yezo. By far the most productive localities were Yoshino, province Yamato, and Nikko, province Shimotsuke, both in the island of Hondo, and Hakodate in the island of Yezo. My collector worked for four years in succession at

Yoshino, the majority of the captures there being made at light, whilst most of the captures at Hakodate were taken at the lighthouse of Tōbetsu in the vicinity of that town.

The total number of species enumerated in this paper is 427, of which 117 are, as far as I am aware, described for the first time as new species, or varieties. There are also 179 species which apparently have not hitherto been recorded by any author as occurring in Japan, thus making a total of 296 species, or over two-thirds of the total number of species mentioned in this paper, which have been added to the Japanese fauna as a result of eleven years' continuous work in the before-mentioned localities. One hundred and eight species which have been recorded as Japanese by various authors since the publication of the late Mr. J. H. Leech's catalogue of Lepidoptera Heterocera from China, Japan and Corea, have also been included for the purpose of bringing his catalogue up to date as far as is possible, and twenty-three species have been mentioned on account of important changes in synonymy. The present record of 427 species therefore makes an interesting addition to the known Japanese fauna, but is by no means final, as there are many parts of Japan which have hitherto entirely escaped the attention of the lepidopterist, notably in the high and inaccessible mountain ranges of the province of Hida, where probably many new species will be found.

As this paper is likely to be of more special interest for Japanese lepidopterists than for others, it may be well to note here that Leech's catalogue was published, at intervals, in the Transactions of this Society for the years 1898 to 1901. He also published a separate paper, which deals with Japanese Geometridae only, in the *Annals and Magazine of Natural History*, Series 6, volumes xix and xx, 1897. These catalogues form, I believe, the most complete record of Japanese species hitherto published, and have been taken by me as the standard authority for the occurrence of species in Japan. Details of his various papers are given in a note appended below.*

* Trans. Ent. Soc. Lond., 1898, pp. 261–379 ; 1899, pp. 99–219 ; 1900, pp. 9–161 and pp. 511–663 ; 1901, pp. 385–513. *Ann. and Mag. Nat. Hist.* (6), vol. xix, 1897, pp. 180–235, pp. 297–463, pp. 543–679 ; vol. xx, pp. 65–248.

The 427 species enumerated in this paper are distributed amongst the various families as follows—

Arctiadae	6	species.
Noctuidae	164	„
Lymantriadae	7	„
Sphingidae	10	„
Cymatophoridae	5	„
Eupterotidae	1	„
Notodontidae	31	„
Geometridae	102	„
Saturniadae	1	„
Uraniadae	3	„
Psychidae	3	„
Cossidae	1	„
Limacodidae	5	„
Zygaenidae	2	„
Drepanidae	2	„
Thyrididae	2	„
Pyralidae	82	„
Total	427	species.

All the new species recorded in this paper, as well as those species which have hitherto been unrecorded from Japan by any previous author, have been worked out at the South Kensington Museum, a few species only having been identified from plates, in those cases where specimens were not available for comparison in the National Collection.

In concluding, I must tender my cordial thanks to Sir George Hampson, Bart., for much valuable aid given in the identification of species and for the facilities so kindly placed at my disposal, and also to Mr. Richard South for continual assistance given during the preparation of the paper.

Family ARCTIADAE.

Sub-family *NOLINAE*.

Genus Celama.

Walker, Cat. Lep. Het., xxxii, p. 500 (1864); Hampson, Cat. Lep. Phal., ii, p. 5 (1900).

1.

Celama innocua.

Celama innocua, Butl., Proc. Zool. Soc. Lond., 1880, p. 671; Hampson, Cat. Lep. Phal., ii, p. 21, pl. xviii, fig. 25 (1900).

Nola costimacula, Staud., Rom. sur Lép., iii, p. 182, pl. x, fig. 6 (1887); *id.*, Cat. Lep. pal., i, p. 361 (1901).

One male specimen taken at Yoshino, Yamato, August, 1899.

Local distribution. Hondo.

General distribution. E. Siberia (Amurland); Formosa; Japan.

Recorded by other authors from Japan (Hampson and Staudinger), but not by Leech.

Collection number, 339.

2.

Celama squalida.

Nola squalida, Staud., Berl. Ent. Zeit., xiv, p. 102 (1870); Mill., Icon. Lep., iii, p. 407, pl. cl, figs. 15, 16; Staud., Cat. Lep. pal., p. 361 (1901).

Nola pumila, Snell, Tijd. v. Ent., xvii, p. 68, pl. vi, fig. 4 (1874).

Nola musculalis, Saalm., Ber. Senck. Ges., 1879, p. 261 (1880); *id.*, Lep. Madag., i, p. 171, pl. vi, fig. 85.

Nola spreta, Butl., P. Z. S., 1880, p. 671.

Sorocostia tetrophthalma, Meyr., Trans. Ent. Soc., 1889, p. 463.

Nola minuta, Hampson, Ill. Het. B. M., viii, p. 48, pl. cxxxix, fig. 14 (1891).

Nola van hasseltii, Heyl., C. R., Soc. Ent. Belge., xxxvi, p. 44 (1892).

Nola ceylonica, Hampson, Ill. Het. B. M., ix, p. 88, pl. clviii, fig. 13 (1893); *id.*, Fauna Brit. India, Moths, ii, p. 141.

Nola hampsoni, Kirby, Cat. Het., p. 376 (1893).

Celama squalida, Hampson, Cat. Lep. Phal., ii, p. 24 (1900); *id.*, Journ. Bomb. N. H. Soc., xiv, p. 109 (1902).

A series of thirteen specimens taken at Yoshino, Yamato, in June, July, August, September, October, 1899, 1900, and one specimen at Shioya, near Kōbe, July, 1901. Hitherto unrecorded from Japan.

Local distribution. HONDO; June to October.
General distribution. EUROPE; W. AFRICA; MADAGASCAR; SYRIA; INDIA; SIKHIM; BURMA; BORNEO; CELEBES; NEW GUINEA; AUSTRALIA; TONGA; FORMOSA; N.E. CHINA (Shanghai); JAPAN.
Collection numbers, 344, 345, 347, 348.

Genus DIALITHOPTERA.

Hampson, Cat. Lep. Phal., ii, p. 50 (1900).

3.

Dialithoptera stellata, sp. n. (Plate XXX, fig. 26.)

♂. Head and thorax whitish, abdomen slightly darker. Forewings silky, white faintly tinged with ochreous towards the base, brownish along the costa, and on the area beyond the post-medial line; post-medial line black, curved and recurved; submarginal line whitish, sinuous; marginal line brown; the transverse line powdered with metallic blue atoms as also is a tuft of black scales at outer end of the cell; fringes dark grey mixed with paler and marked with whitish at ends of the nervules. Hindwings fuscous, paler towards the base; fringes pale grey mixed with darker. Under surface fuscous, whitish along the inner margin of the forewings and the basal area of the hindwings.
Expanse 26 mm.

Male type from Nikko, taken in August, 1895.

Local distribution. HONDO.
Habitat. JAPAN.

Seems to be allied to *D. gemmata*, Hampson, from Sikhim.
Collection number, 342.

Genus AGYLLA.

Walker, Cat. Lep. Het., ii, p. 552 (1854); Hampson, Cat. Lep. Phal., ii, p. 212.

4.

Agylla gigantea.

Lithosia gigantea, Oberth., Diagn. p. 6; Étud. d'Ent., v, p. 29, pl. i, fig. 6 (1880).

Agylla gigantea, Hampson, Cat. Lep. Phal., ii, p. 212 (1900); Staud., Cat. Lep. pal., i, p. 377 (1901).

Five male and nine female specimens taken at Yoshino, Yamato, in June and July, 1899; at Tōbetsu, Oshima, Yezo, in July, 1902, and at Nikko, July, 1893. This species was very common at light at Tōbetsu Lighthouse, near Hakodate. The series does not show any variation in colour and varies in expanse from 30 mm., ♂, to 41 mm., ♀.

Staudinger and Hampson record this species from Japan, but Leech omits it.

Local distribution. Hondo; Yezo.

General distribution. E. Siberia (Amurland, Ussuri); Japan.

Collection number, 284.

Genus Paraona.

Moore, Proc. Zool. Soc. Lond., 1878, p. 8; Hampson, Cat. Lep. Phal., ii, p. 228 (1900).

5.

Paraona staudingeri.

Paraona staudingeri, Alph., Rom. sur Lép., ix, p. 168, pl. xii, fig. 8, ♀ (1897); Hampson, Cat. Lep. Phal., ii, p. 228 (1900).

Five male specimens and one female taken at Yoshino, Yamato, in June, 1895, 1899, 1900 and 1901.

Hitherto unrecorded from Japan.

Local distribution. Hondo.

General distribution. Western China; Corea; Japan.

Collection number, 282.

Genus Schistophleps.

Hampson, Ill. Het. B. M., viii, p. 53 (1891); *id.*, Cat. Lep. Phal., ii, p. 527 (1900).

6.

Schistophleps bipuncta.

Schistophleps bipuncta, Hampson, Ill. Het. B. M., p. 54, pl. cxl, fig. 23 (1891); *id.*, Fauna Brit. India, Moths, ii, p. 125 (1894); *id.*, Cat. Lep. Phal., ii, p. 527, fig. 380 (1900).

Three male and five female specimens taken at Yoshino, Yamato, in July, August and September, 1899 and 1901, and at Kiire, Satsuma, July, 1895.

Hitherto unrecorded from Japan.

Local distribution. HONDO; KYŪSHŪ.

General distribution. INDIA; (ASSAM: Nága Hills, Nilgiris); CEYLON; BURMA; JAPAN.

Collection number, 343.

Family NOCTUIDAE.

Sub-family *AGROTINAE.*

Genus TIMORA.

Walker, Cat. Lep. Het., ix, p. 132 (1856); Hampson, Cat. Lep. Phal., iv, p. 103 (1903).

7.

Timora tosta.

Masalia tosta, Moore, Proc. Zool. Soc. Lond., 1888, p. 411; Butl., Ill. Het. B. M., vii, p. 67, pl. cxxx, fig. 7.

Timora tosta, Hampson, Cat. Lep. Phal., iv, p. 115, pl. lviii, fig. 17 (1893).

A female specimen from Yoshino, Yamato, in August, 1899.

Hitherto unrecorded from Japan.

Local distribution. HONDO.

General distribution. INDIA; JAPAN.

Collection number, 1014.

Genus EUXOA.

Hübner, Verz., p. 209 (1827); Hampson, Cat. Lep. Phal., iv, p. 153 (1903).

8.

Euxoa oberthüri.

Agrotis tritici, Leech, Trans. Ent. Soc. Lond., 1900, p. 29 (*nec.* Linn.).

Euxoa oberthüri, Hampson, Cat. Lep. Phal., iv, p. 310, pl. lxvii, fig. 1 (1903).

One male and six female specimens taken at Tōbetsu, province of Oshima, and Tōkyo in August, September, October, 1894, 1902, 1903. Two specimens also received from Mr. Andrews, Hakodate. The specimen from Pryer's collection referred by Leech to *A. tritici* (*loc. cit.*) is considered by Hampson to be referable to *E. oberthüri*.

Local distribution. Yezo; Hondo.
General distribution. W. China; Japan.
Collection number, 849.

9.

Euxoa intracta.

Agrotis intracta, Walk., x, p. 346 (1856).

Spaelotis ambigua, Butl., Ill. Het. B. M., vii, p. 54, pl. cxxviii, figs. 10, 11 (1889).

Agrotis modesta, Leech, Trans. Ent. Soc. Lond., 1900, p. 28 (*nec.* Moore).

Euxoa intracta, Walk.; Hampson, Cat. Lep. Phal., iv, p. 315, pl. lxvii, fig. 6 (1903).

Unrecorded from Japan by Leech, but recorded by Hampson. Recorded by Leech from China and referred by him to *Agrotis modesta*, Moore.

Local distribution. Hondo, Yokohama (*Lewis, Pryer*), Oiwake (*Leech*); Yezo, Hakodate (*Leech*).
General distribution. India; Tibet; Sikhim; W. China; Japan.

Genus Episilia.

Hübner, Verz., p. 210 (1827); Hampson, Cat. Lep. Phal., iv, p. 467 (1903).

10.

Episilia festiva.

Noctua festiva, Schiff., Wein. Verz., p. 314 (1776); Hübn., Noct., 467,

Noctua primulae, Esp., Schmett., iv, pl. cxxxvi, figs. 5, 6 (1786).
Episilia festiva, Hampson, Cat. Lep. Phal., iv, p. 491 (1903).

One male specimen unlocalised from Japan.
Hitherto unrecorded from Japan.

General distribution. EUROPE; ARMENIA; W. SIBERIA; W. TURKESTAN; E. TURKESTAN; TIBET; JAPAN.
Collection number, 853.

Genus MYTHIMNA.

Hübner, Verz., p. 238 (1827); Hampson, Cat. Lep. Phal., iv, p. 602 (1903).

11.

Mythimna leucographa.

Noctua leucographa, Schiff., Wein. Verz., p. 83 (1775), Hübn., Noct., 411, 572.
Pachnobia leucographa, Staud., Cat. Lep. pal., i, p. 153 (1901).
Mythima leucographa, Hampson, Cat. Lep. Phal., iv, p. 604, fig. 105 (1903).

A female specimen taken at Hakodate, April, 1902.
Hitherto unrecorded from Japan.

Local distribution. YEZO.
General distribution. EUROPE; E. SIBERIA; JAPAN.
Collection number, 921.

Sub-family *HADENINAE.*

Genus POLIA.

Treitschke, Schmett. Eur., v (2), p. 5 (1825); Hampson, Cat. Lep. Phal., v, p. 60 (1905).

12.

Polia bilinea.

Polia bilinea, Wileman, ined.; Hampson, Cat. Lep. Phal., pl. xcvi, fig. 11, p. 603 (1905).

Seven male and six female specimens taken in June, July, August and September, 1895, 1899, 1900 and 1901, at Yoshino, Yamato.
Expanse of series, smallest ♂ 25 mm., largest ♀ 32 mm.

Male type from Yoshino, Yamato, August, 1899 (not from Tōkyo as stated by Hampson, v, p. 603, *supra*), in collection Wileman. Cotype from Tōkyo, August, 1894. The cotype seems to be referable to this species but is in poor condition.

Described by Hampson from Japan, unrecorded by Leech.

Local distribution. HONDO.
Habitat. JAPAN.
Collection numbers, 86, 999.

13.

Polia splendens.

Noctua splendens, Hübn., Noct., 400.
Mamestra splendens, Staud., Cat. Lep. pal., i, p. 157 (1901).
Polia splendens, Hampson, Cat. Lep. Phal., v, p. 134 (1905).

Four male and three female specimens taken at Junsai Numa, Oshima, July, 1896. This species was common at light at the Tōbetsu Lighthouse, near Hakodate, in July and August, 1902.

Hitherto unrecorded from Japan.

Local distribution. YEZO.
General distribution. EUROPE; E. SIBERIA; COREA; JAPAN.
Collection number, 885.

Genus CHABUATA.

Walker, Cat. Lep. Het., xiv, 1034 (1857); Hampson, Cat. Lep. Phal., v, p. 259 (1905).

14.

Chabuata inanis.

Leucania inanis, Oberth., Étud. d'Ent., v, p. 70, pl. iii, fig. 4 (1880); Staud., Cat. Lep. pal., 193.
Chabuata inanis, Hampson, Cat. Lep. Phal., v, p. 268 (1905).

Unrecorded by Leech from Japan, but recorded by Hampson, one specimen in collection Püngeler from Nikko.

One male specimen taken at Tōbetsu, province of Oshima, Yezo, June, 1902.

Local distribution. HONDO; YEZO.
General distribution. EAST SIBERIA; JAPAN.
Collection number, 918.

Genus ERIOPYGA.

Guenée, Noct., i, p. 203 (1852); Hampson, Cat. Lep. Phal., v, p. 291 (1905).

15.

Eriopyga grandis, ab. nov. *bicolor*. (Plate XXX, fig. 22.)

Mythimna grandis, Butl., Ann. and Mag. Nat. Hist. (5), i, p. 79 (1878); *id.*, Ill. Het. B. M., ii, p. 22, pl. xxviii, fig. 7.

Eriopyga grandis, Hampson, Cat. Lep. Phal., v, p. 307, fig. 66 (1905).

The form *bicolor*, of which I have two females from Tōbetsu, province of Oshima, Yezo, has the area of forewings within the antemedial line, and that beyond the postmedial line clouded or suffused with blackish on their outer margins. Female type from Tōbetsu, July, 1902. The second female July, 1903, same locality.

Local distribution. YEZO, Hakodate (*Pryer*); type of *grandis*, ab. *bicolor*, ♀, TŌBETSU (*Wileman*); HONDO, Oiwake (*Pryer*), Tōkyo, Yokohama (*Maries, Jonas, Pryer*).
General distribution. COREA; JAPAN.
Collection number, 1023*a*.

16.

Eriopyga fuliginosa.

Hyphilare fuliginosa, Wileman, ined.

Eriopyga fuliginosa, Hampson, Cat. Lep. Phal., v, p. 609, pl. xcvi, fig. 14 (1905).

Four males and three females. Three received from Mr. Andrews, Hakodate, and four taken at Tōbetsu, Yezo, in June and July, 1902.

Expanse of series, ♂ 50 mm., ♀ 58 mm.

Female type from Tōbetsu, province of Oshima, Yezo, July, 1902, in collection Wileman.

Recorded by Hampson from Japan, unrecorded by Leech.

Local distribution. YEZO.
Habitat. JAPAN.
Collection number, 902.

Genus Cirphis.

Walker, Cat. Lep. Het., xxxii, p. 622 (1865); Hampson, Cat. Lep. Phal., v, p. 478 (1905).

17.

Cirphis simplex.

Leucania simplex, Leech, Trans. Ent. Soc. Lond., 1889, p. 130; *o. c.*, 1900, p. 128.

Cirphis simplex, Hampson, Cat. Lep. Phal., v, p. 503, pl. xcii, fig. 7 (1905).

A male specimen taken at Tōkyo in July, 1894.

Hitherto unrecorded from Japan.

Local distribution. Hondo.

General distribution. Assam; Central China; Japan.

Collection number, 1015.

18.

Cirphis inframicans.

Leucania inframicans, Hampson, Fauna Brit. India, Moths, ii, p. 270 (1894); Ill. Het. B. M., ix, p. 90, pl. clxi, fig. 2 (1893).

Cirphis inframicans, Hampson, Cat. Lep. Phal., v, p. 497 (1905).

Five male and one female specimens taken at Yoshino, Yamato, in August and September, 1899, 1900, and at Oyama, Sagami, in April, 1894.

Hitherto unrecorded from Japan.

Local distribution. Hondo.

General distribution. India; Ceylon; Lower Burma; Japan.

Collection number, 1013.

19.

Cirphis albicosta.

Leucania albicosta, Moore, Proc. Zool. Soc. Lond., 1881, p. 338, pl. xxxvii, fig. 10; Leech, Trans. Ent. Soc. Lond., 1900, p. 127.

Cirphis albicosta, Hampson, Cat. Lep. Phal., v, p. 507, pl. xcii, fig. 12 (1905).

Unrecorded by Leech from Japan, but recorded by Hampson.

Local distribution. HONDO, Oiwake (*Pryer*).
General distribution. INDIA; SIKHIM; BHUTAN; TIBET; W. CHINA; JAPAN.

20.

Cirphis postica.

Leucania postica, Wileman, ined.
Cirphis postica, Hampson, Cat. Lep. Phal., v, p. 535, pl. xcvi, fig. 12 (1905).

Two male and three female specimens taken at Yoshino, Yamato, in September and October, 1899.

The male type is from Yoshino (not from Yokohama as recorded by Hampson, v, p. 535, *supra*), in collection Wileman.

This species seems to come nearest to *curvilinea*, Hamps., from which it differs in having more numerous striae on the forewings, and the hindwings are darker.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 1005.

Genus BOROLIA.

Moore, Proc. Zool. Soc. Lond., p. 334 (1881); Hampson, Cat. Lep. Phal., v, p. 556 (1905).

21.

Borolia stellata.

Borolia stellata, Hampson, Cat. Lep. Phal., v, p. 565, pl. xciv, fig. 30 (1905).

Described by Hampson from Japan, unrecorded by Leech.

Seven male and five female specimens taken at Tōbetsu, Junsai Numa and Hakodate, province of Oshima, Yezo, in June, July and September, 1896, 1902, 1903; one male from Sakura Jima, province of Ōsumi, August, 1898, and another from Yoshino, Yamato.

Local distribution. HONDO, Yokohama (*Pryer*); YEZO, (*Wileman*); KYŪSHŪ (*Wileman*).
Habitat. JAPAN.
Collection numbers, 1019 and 1020.

Genus MELIANA.

Curtis, Brit. Ent., vi, Index (1829); Hampson, Cat. Lep. Phal., v. p. 576 (1905).

22.

Meliana curvilinea.

Leucania curvilinea, Hampson, Ill. Het. B. M., viii, p. 67, pl. cxliv, fig. 3 (1891): Fauna Brit. India, Moths, ii, p. 279 (1894).

Meliana curvilinea, Hampson, Cat. Lep. Phal., v, p. 582 (1905).

A male specimen taken at Yoshino, Yamato, in August, 1899.

Hitherto unrecorded from Japan.

Local distribution. HONDO.

General distribution. INDIA; CEYLON; PERAK; HAINAN; JAPAN.

Collection number, 1018.

Genus LEUCANIA.

Ochsenheimer, Schmett. Eur., iv, p. 81 (1816), non-descr.; Treit., Schmett. Eur., v (2), p. 289 (1825); Hampson, Cat. Lep. Phal., v, p. 590 (1905).

23.

Leucania pudorina.

Noctua pudorina, Schiff., Wien. Verz., p. 85 (1775); Hübn., Eur. Schmett., Noct., figs. 401, 495.

Noctua impudens, Hübn., Eur. Schmett., Noct., fig. 229 (1827); Staud., Cat. Lep. pal., p. 191 (1901).

Leucania obscurata, Staud., Rom. sur Lép., vi, p. 474 (1892).

Leucania pudorina, Hampson, Cat. Lep. Phal., v, p. 600 (1905).

Three males and two females taken at Tōbetsu and Junsai, province of Oshima, Yezo, in July and August, 1902, 1903.

Hitherto unrecorded from Japan.

Local distribution. YEZO.

General distribution. EUROPE; ARMENIA; ASIA MINOR; E. SIBERIA; JAPAN.

Collection number, 1021*g*.

Sub-family *CUCULLIANAE.*

Genus CUCULLIA.

Schrank, Fauna Boica, ii, 2, p. 157 (1802); Hampson, Cat. Lep. Phal., vi, p. 14 (1906).

24.

Cucullia jankowskii.

Cucullia jankowskii, Oberth., Étud. d'Ent., x, p. 23, pl. iii, fig. 2 (1884).

Cucullia jancousci, Hampson, Cat. Lep. Phal., vi, p. 25 (1906).

A series of ten male and two female specimens taken at Tōbetsu, Oshima, in July and August, 1902, 1903.

Hitherto unrecorded from Japan.

Local distribution. YEZO.

General distribution. E. SIBERIA (Amurland, Ussuri); JAPAN.

Collection numbers, 1080 and 1396.

Genus SYMPISTIS.

Hübner, Verz., p. 261 (1827); Hampson, Cat. Lep. Phal., vi, p. 412 (1906).

25.

Sympistis melaleuca.

Noctua melaleuca, Thnbg., Diss. Ent., ii, p. 42, pl. ii, fig. 12 (1791); Staud., Cat. Lep. pal., i, p. 218 (1901).

Sympistis melaleuca, Hampson, Cat. Lep. Phal., vi, p. 414, fig. 141 (1906).

Two female specimens received from Mr. Nawa, of Gifu, Mikawa, by whom they were captured in the vicinity of Gifu, probably at some considerable elevation on Ibuki San (Ibuki Mountain).

Hitherto unrecorded from Japan.

Local distribution. HONDO, Gifu (*Nawa*).

General distribution. NORTH EUROPE; EAST SIBERIA; LABRADOR; JAPAN.

Collection number, 1092.

Genus CONISTRA.

Hübner, Verz., p. 229 (1827); Hampson, Cat. Lep. Phal., vi, p. 443 (1906).

26.

Conistra ardescens ab. *purpurea*, var. nov.

(Plate XXXI, fig. 6.)

Dasycampa ardescens, Butl., Ann. and Mag. Nat. Hist. (5), iv, p. 364 (1879).
Cerastis vaccinii, Leech, Trans. Ent. Soc. Lond., 1900, p. 78 (part), *nec* Linn.
Conistra ardescens, Hampson, Cat. Lep. Phal., vi, p. 455, pl. cvi, fig. 17 (1906).

Ab. *purpurea* ♂. Forewings purplish brown with pale ochreous brown stigmata and submarginal band, the latter with black dots on it between the veins. Hindwing blackish with reddish brown fringes. Under surface reddish grey powdered with black, the forewings suffused with blackish on the disc; all the wings have a blackish postmedial line and there is a blackish lunule on the hindwings.

Expanse 38 mm.

A series of seventeen males and two females of *purpurea* were taken at Junsai Numa, Oshima, in May, 1902. In other specimens of *C. ardescens* taken at same time and place, the forewings are greyish brown in colour and the stigmata and submarginal band hardly paler.

Local distribution. Yezo.
Habitat. Japan.
Collection number, 839.

Genus Cosmia.

Ochsenheimer, Schmett. Eur., iv, p. 84, non-desc.; Treitschke, Schmett. Eur., v (2), p. 379 (1825); Hampson, Cat. Lep. Phal., vi, p. 497 (1906).

27.

Cosmia fulvago ab. *asiatica*, Hampson

Noctua fulvago, Linn., Faun. Suec., p. 312 (1761).
Noctua ocrago, Schiff., Wien. Verz., p. 87 (1776); Hübn., Eur. Schmett., Noct., ff. 190, 444–5.
Xanthia fulvago, Staud., Cat. Lep. pal., p. 208 (1901); Leech, Trans. Ent. Soc. Lond., 1900, p. 19.
Noctua flavescens, Esp., Schmett., iv, pl. cxxii, fig. 2 (1788).
Cosmia fulvago, Hampson, Cat. Lep. Phal., vi, p. 502 (1906).

"Ab. 2, *asiatica*, Bang-Haas. ined. Forewing more orange-yellow, the markings dark brown, the ante- and postmedial costal patches absent; cilia dark brown at tips.—Sir Daria." (Hampson, *op. cit.*, p. 502.)

Fulvago has been recorded from Japan by Leech, but hitherto var. *asiatica*, taken at Sir Daria, W. Turkestan, has not been recorded so far east as Japan. I have one male specimen and one female taken at Junsai Numa, province of Oshima, Yezo, in September, 1901.

Collection number, 818.

28.

Cosmia tunicata.

Xanthia tunicata, Graes., Berl. ent. Zeit., 1889, p. 256; Staud., Cat. Lep. pal., 1901, p. 207.

Cosmia tunicata, Hampson, Cat. Lep. Phal., vi, p. 503, pl. cvii, fig. 13 (1906).

Not mentioned from Japan by Leech. One specimen in National Collection, South Kensington, from Japan recorded by Hampson.

Local distribution. HONDO, Oiwake (*Pryer*).

General distribution. E. SIBERIA; JAPAN.

29.

Cosmia citrago.

Noctua citrago, Linn., Syst. Nat., ed. x, p. 578 (1758); Staud., Cat. Lep. pal., p. 207.

Noctua ochrago, Esp., Schmett., iv, pl. 177, fig. 1 (1791).

Xanthia subflava, Ev., Bull. Mosc., 1848, iii, p. 219, 1855, iv, p. 371 and 1856, ii, pl. i, fig. 3.

Cosmia citrago, Hampson, Cat. Lep. Phal., vi, p. 508 (1906).

One male specimen taken at Junsai Numa, province of Oshima.

Hitherto unrecorded from Japan.

Local distribution. YEZO.

General distribution. EUROPE; ASIA MINOR; JAPAN.

Collection number, 816*a*.

Sub-family *ACRONYCTINAE.*

Genus PARASTICHTIS.

Hübner, Verz., p. 212 (1827); Hampson, Cat. Lep. Phal., vii, p. 76 (1908).

30.

Parastichtis rurea.

Xylopasia rurea, Fabr.; Leech, Trans. Ent. Soc. Lond., 1900, p. 67.
Hadena exstincta, Staud., Stett. ent. Zeit., 1889, p. 43.
Parastichtis rurea, Hampson, Cat. Lep. Phal., vii, p. 97 (1908).

Unrecorded by Leech from Japan, but recorded by Hampson.

Local distribution. Hondo, Yokohama (*Lewis*).
General distribution. Europe; W. Siberia; W. and E. Turkestan; Tibet; E. Siberia (Amurland); W. China; Japan.

Genus Trachea.

Ochsenheimer, Schmett. Eur., iv. p. 75 (1816), nondescr.; Treitschke, v (2), p. 65 (1825); Hampson, Cat. Lep. Phal., vii. p. 113 (1908).

31.

Trachea albidisca.

Hadena albidisca, Moore, Proc. Zool. Soc., 1867, p. 59, pl. vi, fig. 17.
Dianthoecia nivescens, Butl., Ill. Het. B. M., vii, p. 58, pl. cxxviii, fig. 2 (1889).
Euplexia albidisca, Leech, Trans. Ent. Soc., 1900, p. 87.
Trachea albidisca, Hampson, Cat. Lep. Phal., vii, p. 141 (1908).

A male specimen taken at Junsai Numa, Oshima, in July, 1896.

Hitherto unrecorded from Japan.

Local distribution. Yezo.
General distribution. India (Dharmsála, Bengal, Nágas, Nilgiris); Western China; Japan.
Collection number, 1393.

32.

Trachea secalis.

Noctua secalis, Linn., Syst. Nat., ed. x, p. 519 (1758).
Noctua didyma, Esp., Schmett. Eur., iv, p. 378, pl. cxxvi, fig. 7 (1788).

Noctua nictitans, Esp., pl. cxxvi, fig. 6 (*nec* Linn.).
Noctua leucostigma, Esp., pl. clix, fig. 7.
Euplexia didyma, Hampson, Fauna Brit. India, Moths, ii, p. 210 (1894).
Apamea didyma, Leech, Trans. Ent. Soc. Lond., 1900, p. 60.
Trachea secalis, Hampson, Cat. Lep. Phal., vii, p. 211 (1908).

Two males and four females of the typical form; two received from Mr. Andrews, Yezo, and four taken at Jozanke, near Sapporo, Yezo, in August, 1896.

Two males and two females of the form *leucostigma*; three taken at Jozanke and one at Tōbetsu, Oshima, in August, 1902.

Two females of the form *nictitans* taken at Jozanke in August, 1896.

Unrecorded by Leech from Japan, but recorded by Hampson.

Local distribution. Yezo; Hondo, Oiwake (*Pryer*), Yokohama (*Jonas*).

General distribution. Europe; Armenia; Asia Minor; W. and E. Turkestan; India; W. China; Japan.

Collection numbers, 899, 899*a*, 899*b*.

33.

Trachea (?) *yoshinoensis*, sp. n. (Plate XXXI, fig. 13.)

♂. Head and thorax white, collar and patagia marked with brown; abdomen fuscous grey. Forewings white, stippled with brownish at the base; the costa is narrowly edged with brown, and from the middle of this a bilobed brown patch is projected across the wing almost to vein 1, the pale outlined, but indistinct, orbicular stigma is enclosed in the patch, and on the outer edge of the patch is the reniform stigma which is white faintly outlined in brown; the costal edging, which is dotted with white beyond the middle, expands at its termination before the apex; there is a brown mark on the outer margin above the middle and an elongate one before the outer angle, the latter is crossed by an indistinct brownish submarginal line; fringes golden brown chequered with darker and preceded by a series of blackish triangular dots. Hindwings fuscous grey becoming paler towards the base, discal dot black, fringes whitish. Under surface pale fuscous, the inner marginal area of forewings slightly opalescent; hindwings with a blackish discal dot.

Expanse 32 mm.

Male type from Yoshino, Yamato, September, 1899.

A series of four male specimens taken in July and September, 1895, 1899, at Yoshino, Yamato.

Allied to *Trachea askoldis*, Oberthür, and possibly may be a form of that species.

Local distribution. Hondo.
Habitat. Japan.
Collection number, 887.

Genus Euplexia.

Stephens, Ill. Brit. Ent., Haust., iii, p. 3 (1829); Hampson, Cat. Lep. Phal., vii, p. 219 (1908).

34.

Euplexia illustrata.

Euplexia illustrata, Graes., Berl. ent. Zeit., 1888, p. 339; Staud., Cat. Lep. pal., p. 185 (1901); Hampson, Cat. Lep. Phal., vii, p. 225, pl. cxiii, fig. 29 (1908).

Recorded from Japan by Hampson, but not by Leech.

Local distribution. Yezo, Hakodate (*Andrews*); Hondo, Yokohama (*Lewis, Pryer*).
General distribution. E. Siberia (Ussuri); W. China; Corea; Japan.

35.

Euplexia aureopuncta.

Euplexia aureopuncta, South, ined.; Hampson, Cat., Lep. Phal., vii, p. 243, pl. cxiv, fig. 10 (1908).

Five male and three female specimens taken at Tōbetsu and Junsai Numa, province of Oshima, in June, July, August, and September, 1902, 1903.

Type male from Tōbetsu, August, 1902.

Type female from Junsai Numa, July 1902 (not from Tu-shima, as recorded by Hampson). Types in collection Wileman.

Expanse, ♂ 40 mm., ♀ 46 mm.

Described by Hampson from Japan.

Local distribution. Yezo.
Habitat. Japan.
Collection number, 880.

Genus PERIGEA.

Guenée, Noct., i, p. 225 (1852).
Hampson, Cat. Lep. Phal., vii, p. 292 (1908).

36.

Perigea cyclica.

Perigea cyclica, Hampson, Cat. Lep. Phal., vii, p. 315, pl. cxv, fig. 29 (1908).

Described by Hampson from Japan, unrecorded by Leech.

Local distribution. HONDO, Yokohama (*Manley, Pryer*).
Habitat. JAPAN.

37.

Perigea contigua.

Prospalta contigua, Leech, Trans. Ent. Soc. Lond., 1900, p. 122.
Perigea contigua, Hampson, Cat. Lep. Phal., vii, p, 314, pl. cxv, fig. 28 (1908).

A series of seven male and one female specimens taken at Yoshino, Yamato, in June, July, and August, 1899, 1900, and at Junsai Numa, Oshima, July, 1902.
Hitherto unrecorded from Japan.

Local distribution. HONDO; YEZO; June to July.
General distribution. INDIA (Khàsis); WESTERN CHINA; JAPAN.
Collection number, 987.

Genus OLIGIA.

Hübner, Verz., p. 213 (1827); Hampson, Cat. Lep. Phal., vii, p. 361 (1908).

38.

Oligia arctides.

Miana arcta, Oberth., Étud. d'Ent., v, p. 72, pl. iii, fig. 14 (1880) (*nec* Led.).
Hadena arctides, Staud., Stett. ent. Zeit., p. 251 (1888); *id.*, Cat. Lep. pal., p. 175.
Apamea (?) *arctides*, Leech, Trans. Ent. Soc. Lond., 1900, p. 64.
Oligia arctides, Hampson, Cat. Lep. Phal., vii, p. 387 (1908).

Recorded by Hampson from Japan, but not by Leech.

Local distribution. HONDO, Tōkyo (*Maries*).

General distribution. E. SIBERIA (Amurland, Ussuri); N. CHINA; JAPAN.

Genus ERIOPUS.

Treitschke, Schmett. Eur., v. (1), p. 365 (1825); Hampson, Cat. Lep. Phal., vii, p. 531 (1908).

39.

Eriopus placodoides.

Eriopus placodoides, Guen., Noct., ii, p. 296 (1852).
Callopistria placodoides, Hampson, Fauna Brit. India, Moths, ii, p. 256 (1894).
Eriopus placodoides, Hampson, Cat. Lep. Phal., vii, p. 540, fig. 119 (1908).

A series of three male and seven female specimens taken at Yoshino, Yamato, in June, July, August, and September, 1899, and at Ishidzuchi-San, Iyo, in June, 1896.

Hitherto unrecorded from Japan.

Local distribution. HONDO; SHIKOKU.

General distribution. INDIA; BORNEO; JAVA; MALACCA; PULO LAUT; JAPAN.

Collection number, 985.

40.

Eriopus abolineola.

Eriopus abolineola, Graes., Berl. ent. Zeit., 1888, p. 337; Staud., Cat. Lep. pal., p. 184 (1901); Hampson, Cat. Lep. Phal., xii, p. 547, pl. cxii, fig. 2 (1908).
Callopistria rivularis, Leech, Trans. Ent. Soc. Lond., 1900, p. 111 (part), *nec* Walk.

Unrecorded by Leech from Japan, but recorded by Hampson.

Local distribution. HONDO, Yokohama (*Pryer*).

General distribution. E. SIBERIA (Amurland, Pokrafka); JAPAN.

41.

Eriopus clava.

Apamea (?) *clava*, Leech, Trans. Ent. Soc. Lond., 1900, p. 66.

Eriopus clava, Hampson, Cat. Lep. Phal., vii, p. 582, pl. cxxi, fig. 16 (1908).

One male specimen and one female taken at Yoshino, Yamato, in June and July, 1899, 1900. Leech described this species from China from a unique female type.

Hitherto unrecorded from Japan.

Local distribution. Hondo.

General distribution. Western China; Japan.

Collection number, 1077.

Genus Fagitana.

Walker, Cat. Lep. Het., xxxii, p. 645 (1865); Hampson, Cat. Lep. Phal., vii, p. 592 (1908).

42.

Fagitana datanidia.

Nephelodes datanidia, Butl., Cist. Ent., iii, p. 132 (1885).

Nonagria amoena, Staud., Stett. ent. Zeit., p. 254 (1888); Rom. sur Lép., vi, p. 467, pl. viii, fig. 7; *id.*, Cat. Lep. pal., i, p. 187 (1901).

Fagitana datanidia, Hampson, Cat. Lep. Phal., vii, p. 593, pl. cxxi, fig. 20 (1908).

Recorded by Hampson from Japan, but not by Leech.

A series of eleven male and three female specimens taken at Yoshino, Yamato, in September, 1899, 1900, at Karuizawa, Shinano, August, 1895, and at Handa, Awa, in October, 1896.

Local distribution. Hondo, Yokohama (*Pryer*); Shikoku (*Wileman*); August to October.

General distribution. E. Siberia; Japan.

Collection number, 1030.

Genus Chytonix.

Grote, Bull. Buff. Soc. Nat. Sci., ii, p. 66 (1874); Hampson, Cat. Lep. Phal., vii, p. 600 (1908).

43.

Chytonix albonotata.

Bryophila albonotata, Staud., Rom. sur Lép., vi, p. 396, pl. v, fig. 9; *id.*, Cat. Lep. pal., i, p. 165 (1901).

Chytonix albonotata, Hampson, Cat. Lep Phal., vii, p. 610 (1908).

Unrecorded by Leech from Japan, but recorded by Hampson.

Local distribution. Hondo, Nikko (in collectn. Püngeler).
General distribution. E. Siberia (Ussuri); Japan.
Collection number, 1,038.

44.

Chytonix nigribasalis.

Chytonix nigribasalis, Hampson, Cat. Lep. Phal., vii, p. 611, pl. cxxii, fig. 5 (1908).

Four male and two female specimens taken in the following localities: Yoshino, Yamato, June, 1896; Junsai Numa, Oshima, July and August, 1896, 1902; Samajii Awa, September, 1896.

Hitherto unrecorded from Japan.

Local distribution. Yezo; Hondo; Shikoku.
General distribution. Western China (Wa-ssu-kow); Japan.
Collection number, 1038.

Genus Bryomoea.

Bryomoia, Staudinger, Rom. sur Lép., vi, p. 397 (1892);
Bryomoea, Hampson, Cat. Lep. Phal., vii, p. 615 (1908).

45.

Bryomoea melachlora.

Bryomoia melachlora, Staud., Rom. sur Lép., vi, p. 397, pl. v, fig. 10 (1892).
Bryomoea melachlora, Hampson, Cat. Lep. Phal., vii, p. 616; fig. 160 (1908).

One female specimen taken at Jozanke, near Sapporo, Yezo.

Hitherto unrecorded from Japan. Identified from Staudinger's figure.

Local distribution. Yezo.
General distribution. E. Siberia (Ussuri); Japan.
Collection number, 631.

Genus Bryophila.

Treitschke, Schmett. Eur., v (1), p. 57 (1825); Hampson, Cat. Lep. Phal., vii, p. 618 (1908).

46.

Bryophila (?) *pannosa*, sp. n.

♀. Forewings dingy greyish brown with a whitish spot on costa beyond the middle and a whitish apical dash, some whitish scales between them ; three dusky irregular transverse lines, each originating in a black dot on the costa, the outer one (submarginal) diffuse. Hindwings and the underside of all the wings rather darker.

Expanse 19 mm.

One example of each sex from Yoshino, Yamato, taken in June, 1900.

Both specimens are in poor condition, but the female being rather better than the male it has been described.

Local distribution. HONDO.
Habitat. JAPAN.
Collection numbers, 1732 and 1949.

Genus HARRISIMEMNA.

Grote, Trans. Am. Ent. Soc., iv, p. 293 (1873); Hampson, Cat. Lep. Phal., vii, p. 648 (1908).

47.

Harrisimemna marmorata.

Harrisimemna marmorata, South, ined., Hampson, Cat. Lep. Phal., vii, p. 650, fig. 165 (1908).

One male from Chūzenji, near Nikko ; and one female from Tōbetsu, province of Oshima. The former taken in August, 1896, and the latter in August, 1902.

Closely allied to *H. trisignata*, Walk., from North America, but separable from that species by the lesser amount of black marking on forewings which in the present species is almost confined to the central area.

Described by Hampson from Japan, unrecorded by Leech.

Local distribution. YEZO ; HONDO.
Habitat. JAPAN.
Collection number, 1397.

Genus IAMBIA.

Walker, Cat. Lep. Het., xxvii, p. 109 (1863); Hampson Cat. Lep. Phal., vii, p. 654 (1908).

48.

Iambia transversa.

Tycracona transversa, Moore, Lep. Atk., p. 95, pl. iv, fig. 5 (1882); Hampson, Fauna Brit. India, Moths, ii, p. 262 (1894).
Iambia transversa, Hampson, Cat. Lep. Phal., vii, p. 657 (1908).

Unrecorded by Leech from Japan, but recorded by Hampson.

One example of each sex taken at Yoshino, Yamato, June and July, 1899, 1900.

Local distribution. Hondo, Yokohama (*Pryer*).
General distribution. S. Africa; India; Pulo Laut; Central China; Japan.
Collection number, 893.

Genus Aucha.

Walker, Cat. Lep. Het., xiii, p. 1137 (1857); Hampson, Cat. Lep. Phal., vii, p. 661 (1908).

49.

Aucha variegata.

Acontia variegata, Oberth., Diagn., p. 15 (1879); Étud. d'Ent., v, p. 81, pl. iii, fig. 7 (1880).
Calymnia variegata, Staud., Rom. sur Lép., p. 505 (1892).
Aucha variegata, Hampson, Cat. Lep. Phal., vii, p. 661 (1908).

Three female specimens received from Mr. Andrews, Hakodate. One of these differs from Oberthür's type figure in having the white markings on the forewings yellow instead of white.

Hitherto unrecorded from Japan.

Local distribution. Yezo.
General distribution. E. Siberia (Amurland, Ussuri); Japan.
Collection number, 1085.

Genus Bryophilina.

Staudinger, Rom. sur Lép. vi, p. 398 (1892).

50.

Bryophilina blandula.

Bryophilina blandula, Staud., Rom. sur Lép., vi, p. 398. pl. v, fig. 11 (1892); *id.*, Cat. Lep. pal., i, p. 168 (1901).

A series of ten male and three female specimens taken at Yoshino, Yamato, in May, June, July, September and October, 1900, and at Junsai Numa, Oshima, in July, 1902.

Hitherto unrecorded from Japan. Identified from Staudinger's figure.

Local distribution. Hondo; Yezo; May to October.

General distribution. E. Siberia (Ussuri); Japan.

Collection number, 1046.

Genus Canna.

Walker, Cat. Lep. Het., xxxiii, p. 790 (1845); Hampson, Cat. Lep. Phal., viii, p. 19 (1909).

51.

Canna malachitis.

Telesilla malachitis, Oberth., Étud. d'Ent., v, p. 80, pl. iii, fig. 9 (1880); Hampson, Fauna Brit. India, Moths, ii, p. 294; Staud., Cat. Lep. pal., p. 130.

Canna splendens, Moore, Proc. Zool. Soc. Lond., 1888, p. 412; Butl., Ill. Het. B. M., vii, p. 59, pl. cxxviii, fig. 4.

Canna malachitis, Hampson, Cat. Lep. Phal., viii, p. 20 (1909).

Five male specimens taken at Yoshino, Yamato, in August and October, 1899, 1900, and at Nikko, in May and August, 1893; one specimen unlocalised.

Hitherto unrecorded from Japan.

Local distribution. Hondo.

General distribution. India (Sikhim); W. China; E. Siberia; Japan.

Collection number, 1091.

Genus Acronycta.

Ochsenheimer, Schmett. Eur., iv, p. 62 (1815), non-descr.; Treitschke, Schmett. Eur., v (1), p. 3 (1825); Hampson, Cat. Lep. Phal., viii, p. 59 (1909).

52.

Acronycta jankowskii.

Apatela jankowskii, Oberth., Étud. d'Ent., v, p. 69, pl. vii, fig. 1 (1880).

Acronycta jankowskii, Staud., Rom. sur Lép., vi, p. 385; Cat. Lep. pal., i, p. 132 (1901).

Acronycta jancousci, Hampson, Cat. Lep. Phal., viii, p. 75 (1909).

Staudinger and Hampson record this species from Japan. Unrecorded by Leech.

General distribution. E. Siberia (Ussuri); Japan.

53.

Acronycta brumosa.

Acronycta brumosa, Guen., Noct., i, p. 52; Smith, Cat. Noct. N. Am., p. 43.

Apatela persuasa, Harv., Bull. Buff. Soc. Nat. Sci., ii, p. 271 (1875); Smith and Dyar, Pr. U. S. Nat. Mus., xxi, p. 130, pl. iii, fig. 11; Dyar, Cat. Lep. N. Am., p. 103.

Acronycta brumosa, Hampson, Cat. Lep. Phal., viii, p. 78, pl. cxxiv, fig. 27 (1909); Leech, Trans. Ent. Soc. Lond., 1900, p. 103, *nec* Guen.

One female specimen taken at Tōbetsu, province of Oshima, in August, 1903.

Hitherto unrecorded from Japan.

Local distribution. Yezo.

General distribution. N. America; Japan.

Collection number, 960*a*.

54.

Acronycta subornata.

Acronycta subornata, Leech, Proc. Zool. Soc. Lond., 1889, p. 477, pl. i, fig. 6; Trans. Ent. Soc. Lond., 1900, p. 103.

Acronycta subornata, var. *brunnea*, South, ined.; Hampson, Cat. Lep. Phal., viii, p. 85 (1909).

Var. *brunnea* is browner than the type, white markings except on the submarginal line obsolete.

Male type from Tōkyo, March, 1893.

One male specimen and one female from Tōkyo, in March and September, 1893, 1895.

Described by Hampson from Japan, unrecorded by Leech.

Local distribution. HONDO, Yokohama (*Pryer*); Tōkyo (*Wileman*), type ♂ *brunnea*.

General distribution. COREA; JAPAN.

Collection number, 964.

55.

Acronycta albistigma.

Acronycta albistigma, South, ined.; Hampson, Cat. Lep. Phal., viii, p. 93, pl. cxxv, fig. 12 (1909).

Two male and two female specimens from Haramachi and Kosadake, province of Higo, taken in June, 1893.

Male type from Kosadake in collection Wileman.

Local distribution. KYŪSHŪ.

Habitat. JAPAN.

Described by Hampson from Japan.

Most nearly allied to *A. hercules*, Feld.; but the wings are shorter and the brownish basal patch and white orbicular stigma will serve to distinguish this species.

Collection number, 958.

56.

Acronycta catocaloida.

Acronycta catocaloida, Graes., Berl. ent. Zeit., 1888, p. 313; Hampson, Cat. Lep. Phal., viii, p. 95, pl. cxxv, fig. 13 (1909).

Unrecorded by Leech from Japan.

Local distribution. YEZO, Hakodate (Leech).

General distribution. E. SIBERIA (Amurland, Ussuri); JAPAN.

57.

Acronycta psi.

Noctua psi, Linn., Syst. Nat., ed. x, p. 514 (1758); Esp., Schmett., iv, pl. cxv, figs. 1–2; Staud., Cat. Lep. pal., p. 132.

Acronycta bivirgae, Tutt, Entom., p. 50 (1888).

Acronycta suffusa, Tutt, Entom., p. 50 (1888).

Acronycta altaica, Staud., Cat. Lep. pal., p. 132 (1901).

Acronycta psi, Hampson, Cat. Lep. Phal., viii, p. 106 (1909).

Four male specimens taken at Yoshino, province of Yamato, in September, 1899, 1900; Nikko, July, 1893; Tōkyo, June, 1894; Yokohama (*Manley*).

Unrecorded by Leech from Japan, but recorded by Hampson.

Local distribution. HONDO.

General distribution. EUROPE; ARMENIA; ASIA MINOR; SYRIA; W. TURKESTAN; W. and E. SIBERIA; JAPAN.

Collection number, 955.

58.

Acronycta incretata.

Acronycta increta, Butl., Ann. and Mag. Nat. Hist. (5), i, p. 78; *id.*, Ill. Het. B. M., iii, p. 12, pl. xliv, fig. 5 (1879), *nec* Morr., 1874; Staud., Cat. Lep. pal., p. 132.

Acronycta tridens, Leech, Trans. Ent. Soc. Lond., 1900, p. 101, *nec* Schiff.

Acronycta incretata, Hampson, Cat. Lep. Phal., viii, p. 109 (1909).

Recorded under *tridens*, Schiff, by Leech from Japan; referred by Hampson to *increta*, renamed *incretata*.

Local distribution. HONDO, Yokohama (*Jonas, Pryer*).

General distribution. N. CHINA; COREA; JAPAN.

Genus ATHETIS.

Hübner, Verz., p. 209 (1827); Hampson, Cat. Lep. Phal., viii, p. 299 (1909).

59.

Athetis (?) *lapidea*, sp. n.

♂. Antennae ciliated, head and thorax pale greyish brown, abdomen fuscous grey with greyish brown anal tuft. Forewings pale greyish brown tinged with pink; antemedial line blackish, irregular, indented below the middle; postmedial line blackish, serrated; a black discal dot and a series of black dots on the outer margin; there are traces of a dusky central shade and of a submarginal line. Hindwings fuscous grey. Underside whitish, glossy, suffused with fuscous on the costal areas; forewings have a dusky postmedial line and the hindwings a discal dot.

♀. Forewings rather narrower, the central shade and submarginal line well defined.

Expanse 27 mm.

Male and female types from Yoshino, Yamato, August, 1899.

A series of two male and three female specimens taken at Suma, near Kōbe and at Yoshino, Yamato, in June and August, 1899, 1901. The specimens range from 23 mm. to 27 mm. in expanse.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 998.

Genus PETILAMPA.

Aurivillius, Nord. Fjär., p. 156 (1890); Hampson, Cat. Lep. Phal., viii, p. 414 (1909).

60.

Petilampa palustris.

Noctua palustris, Hübn., Eur. Schmett. Noct., f. 367 (1808).
Hydrilla melanochroa, Staud., Rom. sur Lép., vi, p. 488 (1892).
Petilampa palustris, Hampson, Cat. Lep. Phal., viii, p. 415 (1909).

A male specimen from Yoshino, Yamato, taken in June, 1900, is referable to var. *melanochroa*, Staud.
Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. EUROPE; ARMENIA; MONGOLIA; E. SIBERIA; KAMCHATKA; JAPAN.
Collection number, 996.

Genus PROXENUS.

Herr-Schäff, Eur. Schmett., ii, p. 240 (1845); Hampson, Cat. Lep. Phal., viii, p. 430 (1909).

61.

Proxenus dissimilis.

Proxenus dissimilis, South, ined.; Hampson, Cat. Lep. Phal., viii, p. 431, pl. cxxxiii, fig. 15 (1909).

Four male and five female specimens taken at Yoshino, Yamato, in June, August and September, 1899.
Type in collection Wileman.
Described by Hampson from Japan, unrecorded by Leech.

Local distribution. Hondo.
General distribution. Sikhim; S. Borneo; Philippines; Japan.
Collection numbers, 1000 and 1000*a*.

Genus Hadjina.

Staudinger, Iris, iv, p. 286 (1891); Hampson, Cat. Lep. Phal., viii, p. 521 (1909).

62.

Hadjina biguttula.

Mamestra biguttula, Motsch., Bull. Mosc., xxxix, i, p. 194 (1866).
Hadjina biguttula, Hampson, Cat. Lep. Phal., viii, p. 523, pl. cxxxvi, fig. 11 (1909).

Unrecorded by Leech from Japan, but recorded by Hampson.

Local distribution. Hondo, Tsuruga (*Leech*), Tōkyo (*Maries*), Yokohama (*Fenton, Pryer*).
General distribution. Corea; Japan.

63.

Hadjina ferruginea.

Hadjina ferruginea, South, ined.; Hampson, Cat. Lep. Phal., viii, p. 531, pl. cxxxvi, fig. 20 (1909).

Female type from Shiokubi, near Hakodate, province of Oshima, August, 1902 (not from Tu-shima as recorded by Hampson, viii, p. 531, *supra*), in collection Wileman.

Local distribution. Yezo.
Habitat. Japan.
Collection number, 1236*a*.

Genus Hydroecia.

Duponchel, Cat. Méth., p. 114 (1844); Hampson, Cat. Lep. Phal., ix, p. 35 (1910).

64.

Hydroecia basalipunctata.

Gortyna basalipunctata, Graes., Berl. ent. Zeit., p. 341 (1888); Hampson, Moths India, ii, p. 171; Staud. Cat. Lep. pal., p. 187.

Gortyna intermixta, Swinh., Trans. Ent. Soc. Lond., 1891, p. 480, pl. xix, fig. 11.
Hydroecia basalipunctata, Hampson, Cat. Lep. Phal., ix, p. 49 (1910).

Unrecorded by Leech from Japan, but recorded by Hampson.

Local distribution. YEZO, Hakodate (*Leech*); HONDO, Oiwake (*Pryer*).
General distribution. ASSAM; E. SIBERIA; JAPAN.

Genus ELYDNA.

Walker, Cat. Lep. Het., xv, p. 1712 (1858); Hampson, Cat. Lep. Phal., ix, p. 158 (1910).

65.

Elydna lineosa.

Dadica lineosa, Moore, Proc. Zool. Soc. Lond., 1881, p. 349.
Caradrina palpalis, Leech, Trans. Ent. Soc. Lond., 1900, p. 119 (part).
Elydna lineosa, Hampson, Cat. Lep. Phal., ix, p. 167, fig. 58 (1910).

Recorded by Leech from Japan under *Caradrina palpalis*, and separated by Hampson.

Local distribution. HONDO, Tōkyo (*Maries*), Yokohama (*Pryer*).
General distribution. INDIA; W. CHINA; JAPAN.

66.

Elydna truncipennis.

Elydna truncipennis, Hampson, Cat. Lep. Phal., ix, p. 168, fig. 59 (1910).

Unrecorded from Japan by Leech, described by Hampson.

Local distribution. KYŪSHŪ, Satsuma (*Leech*); HONDO, Tōkyo (*Maries*), Yokohama (*Jonas, Manley, Pryer*).
General distribution. INDIA; CEYLON; W. CHINA; N. CHINA; COREA; JAPAN.

67.

Elydna albisignata.

Caradrina albosignata, Oberth., Étud. d'Ent., v, p. 73, pl. iv, fig. 1 (1880).

Caradrina palpalis, Leech, Trans. Ent. Soc. Lond., 1900, p. 119 (part).
Caradrina cæca, Oberth., Diag. Lep. Askold, p. 14 (1879).
Elydna albisignata, Hampson, Cat. Lep. Phal., ix, p. 172 (1910).

Recorded by Leech from Japan under *Caradrina palpalis*, Butl., separated by Hampson and transferred by him to Genus *Elydna*.

Local distribution. Hondo, Oiwake (*Pryer*), Tōkyo (*Maries*).
General distribution. ? S. France; E. Siberia (Amurland); Corea; Japan.
Aberration. Cæca; Amurland. Reniform stigma of forewing without the white point.

Genus Calymnia.

Hübner, Verz., p. 235 (1827); Hampson, Cat. Lep. Phal., ix, p. 186 (1910).

68.

Calymnia jankowskii.

Eugraphia jankowskii, Oberth., Étud. d'Ent., x, p. 25, pl. iii, fig. 8 (1884); Staud., Rom. sur Lép., vi, p. 506 (1892).
Calymnia jancousci, Hampson, Cat. Lep. Phal., ix, p. 195 (1910).

A female specimen taken in August, 1896, near Sapporo, Ishikari.

Hitherto unrecorded from Japan.

Local distribution. Yezo.
General distribution. Ussuri; Japan.
Collection number, 1084.

69.

Calymnia exigua.

Mesogona exigua, Butl., Trans. Ent. Soc., p. 182 (1881).
Calymnia saturata, Staud., Rom. sur Lép., vi, p. 504 (1892); *id.*, Cat. Lep. pal., p. 201.
Cosmia trapezina, Leech, Trans. Ent. Soc. Lond., 1900, p. 153 (part), *nec* Linn.
Calymnia exigua, Hampson, Cat. Lep. Phal., ix, p. 197, pl. cxli, fig. 31 (1910).

Recorded from Japan by Leech as a form of *trapezina*, Linn, and separated by Hampson.

Local distribution. YEZO (*Pryer, Andrews*); HONDO, Oiwake (*Pryer*), Tōkyo (*Fenton*).

General distribution. E. SIBERIA; W. CHINA; JAPAN.

70.

Calymnia bifasciata.

Grammesia bifasciata, Staud., Stett. ent. Zeit., 1888, p. 254; *id.*, Rom. sur Lép., vi, p. 482, pl. viii, fig. 8; Cat. Lep. pal., i, p. 195, No. 1987 (1901).

Cosmia pryeri, Leech, *id.*, Proc. Zool. Soc. Lond., 1889, p. 516, pl. li, fig. 11; Trans. Ent. Soc. Lond., 1900, p. 154.

Calymnia bifasciata, Hampson, Cat. Lep. Phal., ix, p. 200 (1910).

Eight male and two female specimens taken in the following localities: Yoshino, Yamato, June, July and August, 1899, 1900, 1901; Junsai Numa, Oshima, June, 1902; Tōkyo, bred June, 1895. Oiwake (*Pryer*).

Recorded by Leech from Japan under *pryeri*, but *bifasciata* has priority.

Local distribution. HONDO.

General distribution. E. SIBERIA; JAPAN.

Collection number, 1078.

Genus NONAGRIA.

Ochsenheimer, Eur. Schmett., iv, p. 82 (1816), nondescr.; Treitschke, Schmett. Eur., v (2), p. 309 (1825); Hampson, Cat. Lep. Phal., ix, p. 321 (1910).

71.

Nonagria (?) *obscura*, sp. n.

♂. Head and thorax dark grey brown, abdomen fuscous grey. Forewings grey brown with a slight purple suffusion, venation, especially the median nervure, prominent; two black dots between veins 2 and 4. Hindwings fuscous grey. Underside fuscous grey, hindwings paler.

Expanse 30 mm.

Male type from Yoshino, Yamato, July, 1900.

Local distribution. HONDO.

Habitat. JAPAN.

Collection number, 1031.

Genus Arenostola.

Hampson, Cat. Lep. Phal., ix, p. 281 (1910).

72.

Arenostola lutosa.

Noctua lutosa, Hübn., Noct., fig. 232 (1802).
Arenostola lutosa, Hampson, Cat. Lep. Phal., ix, p. 281, fig. 120 (1910).

Six male specimens. One from Karuizawa, province of Shinano, August, 1895; four from Tōbetsu, province of Oshima, and one from Junsai Numa, province of Oshima, in June and September, 1902, 1903.

Hitherto unrecorded from Japan.

Local distribution. Yezo; Hondo.
General distribution. Europe; W. Turkestan; E. Siberia; Japan.
Collection numbers, 1010, 1021*b*, 1021*c*.

Genus Archanara.

Walker, Cat. Lep. Het., xxxv, p. 1737 (1866); Hampson, Cat. Lep. Phal., ix, p. 292 (1910).

73.

Archanara resoluta.

Archanara resoluta, Hampson, Cat. Lep. Phal., ix, p. 294, pl. cxliii, fig. 25 (1910).

Described by Hampson from Japan. Type from Tōkyo (*Maries*) in National Collection, South Kensington. Unrecorded by Leech.

Two male specimens from Yoshino, Yamato, taken in June, 1895, and August, 1899.

Local distribution. Hondo.
Habitat. Japan.
Collection number, 1029.

74.

Archanara polita.

Nonagria polita, Walk., Cat. Lep. Het., xxxii, p. 629 (1865).
Archanara nonogriella, Walk., *op. cit.*, xxxv, p. 1737 (1866).

Archanara polita, Hampson, Cat. Lep. Phal., ix, p. 296, pl. cxliii, fig. 26 (1910).

Unrecorded by Leech, but recorded by Hampson from Japan.

Local distribution. Hondo, Yokohama (*Pryer*, type).
General distribution. Central China; Japan.

Genus Chasminodes.

Hampson, Cat. Lep. Phal., ix, p. 349 (1910).

75.

Chasminodes cilia.

Leocyma cilia, Staud., Stett. ent. Zeit., 1888, p. 263; Rom. sur Lép., vi, p. 557, pl. x, fig. 10 (1892); *id.*, Cat. Lep. pal., p. 225 (1901).
Chasminodes cilia, Hampson, Cat. Lep. Phal., ix, p. 350 (1910).

A female specimen taken at Amagase, Yamato, July, 1894.

Hitherto unrecorded from Japan.

Local distribution. Hondo.
General distribution. E. Siberia (Amurland, Ussuri); Japan.

Collection number, 1035.

Sub-family *ERASTRIANAE.*

Genus Enispa.

Walker, Cat. Lep. Het., xxxiv, p. 1275 (1865); Hampson, Cat. Lep. Phal., x, p. 40 (1910).

76.

Enispa leucosticta.

Hampson, Cat. Lep. Phal., x, p. 59 (1910), pl. cl, fig. 16, ined.

♂. Pale greyish brown, vertex of head white, antennae ciliated. Forewings have two white transverse lines commencing as spots on the costa but indistinct thence to inner margin, the antemedial is nearly straight and the postmedial is slightly angled above the inner margin. Hindwings with some white markings indicating a postmedial line. Fringes paler, preceded by a series of black dots. Underside fuscous markings of upperside faintly indicated.

Expanse 16 to 18 mm.

A series of eight males and two females, taken at Hase and at Yoshino, province of Yamato, in May and June, 1900, 1901.

Male type from Yokohama in National Collection, South Kensington.

Local distribution. HONDO.
Habitat. JAPAN.
Collection numbers, 1111, 1374.

77.

Enispa (?) *ornata*, sp. n. (Plate XXX, fig. 6.)

♂. Forewings bright ochreous, basal area clouded with purplish brown; ante- and postmedial lines purplish brown, the enclosed space also purplish brown but slightly paler, both lines crenulate the outer one bent inwards under the cell; submarginal line purplish brown, wavy, intersecting a cloud of the same colour on the outer margin; a black colon-like discal mark. Hindwings similar to the forewings, but there is no antemedial line and no ochreous colour on the basal area, discal dot black. Fringes ochreous marked with purplish brown and preceded by black dots. Under surface pale fuscous tinged with ochreous on outer marginal area. Forewings have dusky postmedial and submarginal lines and the postmedial is continued on the hindwings.

Male type from Yoshino, Yamato, June, 1900.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 396.

Genus ORUZA.

Walker, Cat. Lep. Het., xxiv, 1089 (1862); Hampson, Cat. Lep. Phal., x, p. 234 (1910).

78.

Oruza glaucotorna.

Oruza glaucotorna, Hampson, Cat. Lep. Phal., x, p. 249 (1910).

Two males and two females taken in May, June, July and August, 1894, 1895, at the following localities; Hayakusu, province of Higo; Iida-San, province of Higo; Kiire and Chiran, province of Satsuma.

♂ Type in National Collection, from Kyūshū (ex coll. Leech).

Local distribution. KYŪSHŪ.
General distribution. COREA; JAPAN.
Collection number, 541.

Genus CORGATHA.

Walker, Cat. Lep. Het., xvi, 215 (1858); Hampson, Cat. Lep. Phal., x, p. 286 (1910).

79.

Corgatha nitens.

Celeopsyche nitens, Butl., Ill. Het. B. M., iii, p. 68, pl. lvii, fig. 10 (1879).
Corgatha fasciola, Leech, Trans. Ent. Soc. Lond., 1900, p. 512.
Corgatha nitens, Hampson, Cat. Lep. Phal., x, p. 291 (1910).

Re-described by Leech from Japan as *Corgatha fasciola*. *Nitens* was not recorded by Leech from Japan.

Twelve male and six female specimens taken at Yoshino, Yamato, in June, July, August and September, 1899, 1900.

Local distribution. HONDO, Yokohama (*Pryer*), Tōkyo (*Fenton*), Sakata (*Leech*), Yoshino (*Wileman*).
General distribution. CENTRAL CHINA; JAPAN.
Collection number, 1703.

80.

Corgatha ruficeps.

Thermesia ruficeps, Walk., Journ. Linn. Soc. Zool., vii, p. 186 (1864); Swinh., Cat. Het. Mus. Oxon., ii, p. 70, pl. i, fig. 17.
Thermesia sparsa, Walk., Journ. Linn. Soc. Zool., vii, p. 187 (1864).
Corgatha castaneiceps, Hampson, Moths India, iv, p. 519 (1896).
Corgatha ruficeps, Hampson, Cat. Lep. Phal., x, p. 294 (1910), pl. clvii, fig. 18, ined.

Six males and four females from Yoshino, province of Yamato, taken in August and September, 1899, 1900;

at Yokohama in July, 1898; one specimen unlocalised. These specimens range from 18 to 27 mm. in expanse, and they are all brighter in colour and markings than Indian examples.

Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. CEYLON; BORNEO; JAPAN.
Collection number, 1108.

81.

Corgatha yoshinoensis, sp. n. (Plate XXXI, fig. 14.)

♂. Ochreous brown, tinged with reddish and sparsely sprinkled with black scales. Forewing slightly paler along the costa, three black dots in the centre representing the stigmata; the antemedial line ochreous outwardly shaded with greyish, indistinct on costal area; postmedial line ochreous, inwardly shaded with greyish, indented above the middle thence slightly curved to inner margin; submarginal line ochreous, oblique from costa to outer extremity of vein 4, thence wavy to the tornus. Hindwing has a grey-edged ochreous discal lunule; postmedial line ochreous inwardly shaded with greyish, and obtusely angled at middle; submarginal line similar to that on the forewing. Under surface whitish brown, all the wings have a dusky medial line.

Expanse 22 mm.

A series of four male specimens taken at Yoshino, Yamato, in May and July, 1900, allied to *C. mira* (Butl.), but distinguished by the different colour, and the direction of the transverse lines.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 1102.

82.

Corgatha (?) *pygmaea*, sp. n.

♂. Pale brown with a strong vinous suffusion and sparingly powdered with black atoms. Forewings have a discal dot and an oblique postmedial line. Hindwings have a blackish discal dot and a medial line, the latter appearing to be a continuation of the line on forewings; a marginal series of black dots. Underside whitish brown, suffused with pale fuscous; lines of the upperside faintly indicated.

Expanse 13 mm.

Male type from Yoshino, Yamato, July, 1900.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 1110.

Genus STENOLOBA.

Staudinger, Rom. sur Lép., vi, p. 381 (1892); Hampson, Cat. Lep. Phal., x, p. 366 (1910).

83.

Stenoloba jankowskii.

Dichagyris jankowskii, Oberth., Étud. d'Ent., x, p. 28, pl. iii, fig. 5 (1884); Staud., Cat. Lep. pal., p. 361.
Edema nivilinea, Leech, Proc. Zool. Soc. Lond., 1888, p. 638, pl. xxxii, fig. 1; *id.*, Trans. Ent. Soc. Lond., 1898, p. 300.
Stenoloba jankowskii, Leech, Trans. Ent. Soc. Lond., 1899, p. 216.
Stenoloba jancouscri, Hampson, Cat. Lep. Phal., x, p. 367 (1910).

Recorded by Leech from Japan, in family *Notodontidae*, as *Stenoloba jankowskii* transferred by Hampson to the *Noctuidae*.

Local distribution. HONDO, Oiwake, Yokohama (*Pryer*).
General distribution. E. SIBERIA (Ussuri); JAPAN.

Genus OZARBA.

Walker, Cat. Lep. Het., xxxii, 684 (1865); Hampson, Cat. Lep. Phal., x, p. 393.

84.

Ozarba incondita.

Metachrostis incondita, Butl., Ill. Het. B. M., vii, p. 69, pl. cxxx, fig. 13 (1889); Hampson, Fauna Brit. India, Moths, ii, p. 328 (1894).
Ozarba incondita, Hampson, Cat. Lep. Phal., x, p. 448 (1910).

Two male specimens taken at Yoshino, Yamato, and Iida-San, Higo, in May, 1899 and 1900.
Hitherto unrecorded from Japan.

Local distribution. HONDO; KYŪSHŪ.

General distribution. INDIA; BURMA; CEYLON; SINGAPORE; CENTRAL and W. CHINA; JAPAN.

Collection number, 1065.

85.

Ozarba (?) *obliquisigna.*

Metachrostis obliquisigna, Hampson, Fauna Brit. India, Moths, ii, p. 326 (1894).

A series of nine male and one female specimens taken at Yokohama in August, 1898, and at Yoshino, Yamato, in August, 1899.

Hitherto unrecorded from Japan.

Local distribution. HONDO.

General distribution. DHARMSÁLA; JAPAN.

Collection number, 1375.

Genus EULOCASTRA.

Butler, Trans. Ent. Soc. Lond., p. 419 (1886); Hampson, Cat. Lep. Phal., x, p. 618 (1910).

86.

Eulocastra undulata.

Erastria undulata, Snell., Veth's Midden. Sumatra Lep., p. 45 (1880).

Acontia excisa, Swinh., Proc. Zool. Soc. Lond., p. 455 (1885); Hampson, Moths India, ii, p. 318.

Acontia excisa, Butl., Ill. Het. B. M., vii, p. 61, pl. xxix, figs. 5–6 (1889).

Eulocastra undulata, Hampson, Cat. Lep. Phal., x, p. 625 (1910).

One male specimen and one female taken at Yoshino, Yamato, in July, 1900.

Hitherto recorded from Japan.

Local distribution. HONDO.

General distribution. INDIA; BURMA; NICOBARS; PHILIPPINES; SUMATRA; CELEBES; COREA; JAPAN.

Collection number, 1099.

87.

Eulocastra latifasciata, sp. n.

♂. Forewing fuliginous, with a broad antemedial, pale yellowish band which is narrowed towards the costa, and is preceded and

followed by blackish marks in the cell, a yellowish spot on the costa one-third from apex; there are indications of an irregular yellowish band between the spot and the inner margin. Hind-wings dark fuscous, discoidal dot still darker. Fringes of the general colour with an inwardly blackish-edged pale line at their base. Underside similar to the upper, but the yellow markings are indistinct.

Expanse 19 mm.

Male type from Yoshino, Yamato, July, 1900. Superficially resembles *E. aethiops*, Distant, but is smaller, and the wings, which are narrower, are distinguished by the broad fascia.

Local distribution. HONDO, Yoshino (*Wileman*).
Habitat. JAPAN.
Collection number, 1100.

Genus NARANGA.

Moore, Proc. Zool. Soc., p. 359 (1881); Hampson, Cat. Lep. Phal., x, p. 630 (1910).

88.

Naranga aenescens.

Naranga aenescens, Moore, Proc. Zool. Soc. Lond., p. 359 (1881); Hampson, Cat. Lep. Phal., x, p. 632 (1910), pl. clxviii, fig. 3.
Naranga diffusa, Leech, Trans. Ent. Soc. Lond., p. 157 (1900), *nec* Walk.

Diffusa, Walk., was recorded from Japan by Leech; but these specimens, which are in the National Collection, have been referred by Hampson to *aenescens*, Moore.

Local distribution. HONDO, Fushiki (*Leech*), Tsuruga (*Leech*), Tōkyo (*Maries*), Yokohama (*Pryer*); KYŪSHŪ (*Leech*).
General distribution. CENTRAL CHINA; FORMOSA; JAPAN.

Sub-family *EUTELIANAE.*

Genus EUTELIA.

Hübner, Verz., p. 259 (1827); Hampson, Fauna Brit. India, Moths, ii, p. 390 (1894).

89.

Eutelia viridinota.

Eutelia viridinota, Swinh., Trans. Ent. Soc. Lond., p. 52 (1895).

Two male specimens taken at Yoshino, Yamato, in June and July, 1900, 1901.

Hitherto unrecorded from Japan.

Local distribution. HONDO.

General distribution. SIKHIM; BHUTAN (Cherra Punji); KHÁSIS; JAPAN.

Collection number, 1130.

90.

Eutelia grabezewskii.

Eutelia grabezewskii, Püngeler, Deutsch. ent. Zeitschr., Iris, xvi, p. 289, pl. vi, fig. 5 (1904).

This species is only represented in the National Collection by a coloured figure of the type. Unrecorded by Leech from Japan.

Local distribution. HONDO, Nikko (type in collection Püngeler).

Habitat. JAPAN.

Sub-family *SARROTHRIPINAE.*

Genus GADIRTHA.

Walker, Cat. Lep. Het., xii, p. 1102 (1857); Hampson, Fauna Brit. India, Moths, ii, p. 367 (1894).

91.

Gadirtha inexacta.

Gadirtha inexacta, Walk., *l. c.*; Leech, Trans. Ent. Soc. Lond., 1900, p. 514; Hampson, Fauna Brit. India, Moths, ii, p. 367, fig. 200 (1894).

Two male and three female specimens taken at Yoshino and Tennokawa, Yamato, in June, July, August and September, 1894, 1899, 1900; at Tōkyo, March, 1893. Two specimens agree with Chinese examples in being much darker than the type.

Hitherto unrecorded from Japan.

Local distribution. HONDO.

General distribution. SIKHIM; MOULMEIN; CENTRAL and SOUTHERN CHINA; JAPAN.

Collection number, 813.

Genus ASINDUMA.

Walker, Cat. Lep. Het., xxxiii, Suppl. p. 900 (1865).

92.

Asinduma hampsoni, sp. n.

♂. Forewings blackish grey marked with black, ochreous, and pale grey; the basal two-thirds of inner marginal area pale ochreous, the upper edge indented; antemedial line black, zigzag; postmedial band black, edged with pale grey, curved; submarginal band black, crenulate; stigmata pale ochreous, ringed and centred with black, set in a greyish patch which is tinged with ochreous below the stigmata; fringes pale grey, traversed by a darker interrupted line. Hindwings dark fuscous with paler fringes. Underside fuscous, the costa of forewings marked with whitish. Thorax ochreous white.

Expanse 22 mm.

Male type from Yoshino, Yamato, May, 1900.

A series of eight male and five female specimens taken at Yoshino, Yamato, in May, June, July, August and September, 1899, 1900 and 1901. Expanse of series, ♂ 22 mm. to 24 mm. ♀.

Local distribution. HONDO.

Habitat. JAPAN.

Collection number, 1045.

Genus HYPOTHRIPA.

Hampson, Fauna Brit. India, Moths, ii, p. 383 (1894).

93.

Hypothripa ruficirra.

Hampson, Ann. and Mag. Nat. Hist. (7), xvi, p. 540 (1905).

Described and recorded by Hampson from Japan.

One male and four female specimens taken at Yoshino, Yamato, in September and October, 1899, 1900, and at Tōkyo in April and October, 1894, 1895.

Local distribution. HONDO (Yokohama type B. M.).

General distribution. INDIA (Khásis); ASSAM; JAPAN.

Collection number, 1719.

Sub-family *ACONTIANAE.*

Genus MACROCHTHONIA.

Butler, Trans. Ent. Soc. Lond., p. 599 (1881).

94.

Macrochthonia fervens.

Macrochthonia fervens, Butl., Trans. Ent. Soc. Lond., 1881, p. 599.

Eccopteroma falcata, Graes., Berl. ent. Zeit., 1889, p. 257, ♀; Staud., Rom. sur Lép., vi, p. 506, pl. vii, fig. 10; *id.*, Cat. Lep. pal., p. 203 (1901).

Eccopteroma (?) *pyrausta*, ♂, Graes., Berl. ent. Zeit., 1889, p. 258; Staud., Rom. sur Lép., vi, p. 509.

Described by Butler from Japan. Unrecorded by Leech.

Six male and three female specimens taken at Yoshino, Yamato, in May, June, September and October, 1895, 1899, 1900, and at Junsai Numa, Oshima, in July, 1902; also one unlocalised specimen.

My smallest male specimen, which measures 30 mm. in expanse, agrees extremely well, both in colour and markings, with the figure of *E. falcata*, Staud. (*supra*), whilst other specimens of the series which are darker agree better with Butler's description of *M. fervens*, having an oblique black-edged medial band on the forewings darker than in Staudinger's figure. The series measures in expanse from 30 mm., smallest ♂, to 40 mm., largest ♀. Staudinger records *E. falcata* from Japan, but does not mention *fervens*, Butler.

Local distribution. HONDO; YEZO.

General distribution. E. SIBERIA (Bussuri ?, Amurland); CHINA (Che Kiang); JAPAN.

Collection number, 1086.

Genus GELASTOCERA.

Butler, Ann. and Mag. Nat. Hist. (4), xx, p. 476 (1877); Hampson, Fauna Brit. India, Moths, ii, p. 427 (1894).

95.

Gelastocera duplicata, sp. n.

♀. Forewings pinkish pale brown, with greyish suffusion, median area traversed by an oblique, double brown band, a short brown mark

on the costa towards the apex. Hindwings fuscous, paler and tinged with ochreous on the outer area. Underside whitish tinged with ochreous towards the margins, forewings have a blackish discal suffusion.

Expanse 38 mm.

Female type from Yoshino, Yamato, September, 1899.

A series of three male and two female specimens taken in July, August and September, 1899, 1902, 1903, at the following localities: Yoshino, Yamato; Junsai Numa and Tōbetsu, Oshima.

Local distribution. HONDO; YEZO.
Habitat. JAPAN.
Collection number, 1405.

96.

Gelastocera (?) *insignita*, sp. n.

♂. Forewings light brown, powdered with darker; ante- and post-medial lines indicated by black dots; submarginal line dusky, wavy; reniform spot pale with two black dots on it; a series of black dots on the outer margin, and a small black spot on the middle of the inner margin. Hindwings fuscous brown. Underside pale brown, suffused with fuscous; all the wings have an obscure postmedial line.

Expanse 20 to 26 mm.

Male type from Senzoku, Iyo, June, 1896.

Two male specimens taken at Senzoku, Iyo, and Takio, Higo, in May, June, 1896 and 1899.

Local distribution. SHIKOKU; KYŪSHŪ.
Habitat. JAPAN.
Collection number, 1566.

Genus WESTERMANNIA.

Hübner, Zutr., ii, 23 (1823). Hampson, Moths India, ii, p. 358 (1894).

97.

Westermannia nobilis.

Heterogenea nobilis, Staud., Rom. sur Lép., iii, p. 196, pl. xi, fig. 8 (1887).
Phrixolepia nobilis, Staud., Cat. Lep. pal., p. 392 (1901).

Three male and four female specimens from Yoshino, Yamato, taken in June and July, 1900 and 1901.

Hitherto unrecorded from Japan.

Local distribution. HONDO.

General distribution. E. SIBERIA (Ussuri); JAPAN.

Collection numbers, 119 and 119*a*.

Genus HALIAS.

Treitschke, Schmett. Eur., vii, p. 227 (1829); Hampson, India, Moths, ii, p. 132 (1894).

98.

Halias magnifica.

Hylophila magnifica, Leech, Entom., xxiii, p. 83 (1890).
Halias magnifica, Leech, Trans. Ent. Soc. Lond., p. 204 (1899).

A male from Tōkyo, almost exactly identical with the type which was from Chang-yang, Central China. This specimen was bred on May 1, 1893, from a pupa dug up.

Hitherto unrecorded from Japan.

Local distribution. HONDO.

General distribution. CENTRAL CHINA; JAPAN.

Collection number, 331.

Genus PARACRAMA.

Moore, Lep. Ceyl., iii, p. 54 (1894).

99.

Paracrama dulcissima.

Nolasena dulcissima, Walk., Journ. Linn. Soc., vii, p. 76.
Paracrama dulcissima, Moore, Lep. Ceyl., iii, pl. cl., fig. 11.
Paracrama rectomarginata, Hampson, Ill. Het. B. M., viii, p. 46, pl. cxxix, fig. 7.
Paracrama dulcissima, Hampson, Fauna Brit. India, Moths, ii, p. 134 (1894).

A male specimen taken at Yoshino, Yamato, June, 1895.

Hitherto unrecorded from Japan.

Local distribution. HONDO.

General distribution. NÁGAS; NILGIRIS; CEYLON; ANDAMANS; BORNEO; JAPAN.

Collection number, 1401.

Genus Sinna.

Walker, Cat. Lep. Het., xxxii, p. 641 (1865); Hampson, Fauna Brit. India, Moths, ii, p. 128 (1894).

100.

Sinna extrema ab. *unicolor*, ab. nov. (Plate XXXI, fig. 25.)

Deiopeia extrema, Walk., Cat. Lep. Het., ii, p. 573 (1874).
Sinna extrema, Leech, Trans. Ent. Soc. Lond., 1899, p. 202.

ab. *unicolor*. Uniform creamy white without markings; hind-wings shining, with a faint pinkish tinge.

One example of *unicolor* from Ishidzuchi-San, Iyo, July, 1896.

Local distribution. Shikoku.
Habitat. Japan.
Collection number, 1394.

Genus Siglophora.

Butler, Proc. Zool. Soc. Lond., 1892, p. 123; Hampson, Fauna Brit. India, Moths, ii, p. 135 (1894).

101.

Siglophora ferreolutea.

Siglophora ferreolutea, Hampson, Trans. Ent. Soc. Lond., 1895, p. 206.
Siglophora (?) *ferruginea*, Leech, Trans. Ent. Soc. Lond., 1899, p. 206.

This species was re-described by Leech from Japan, under the name of *ferruginea*. Two males and one female taken at Iida-San, Higo, in May, 1899, and at Ōmine-San and Yoshino, Yamato, in August and September, 1894 and 1900.

Local distribution. Kyūshū; Hondo.
General distribution. Sikhim; Japan.
Collection number, 332.

Genus Risoba.

Moore, Proc. Zool. Soc. Lond., 1881, p. 328; Hampson, Fauna Brit. India, Moths, ii, p. 398 (1894).

102.

Risoba obstructa.

Risoba obstructa, Moore, Proc. Zool. Soc. Lond., 1881, p. 328; *id.*, Lep. Ceyl., iii, pl. cxliv, figs. 2, 2*a*, 2*b* (larva).
Risoba vialis, Moore, Lep. Atk., p. 91, pl. iv, fig. 1.
Risoba prominens, Moore, Proc. Zool. Soc. Lond., 1881, p. 329.
Risoba obstructa, Hampson, Fauna Brit. India, ii, p. 398 (1894).

A series of four male and eleven female specimens taken at Yoshino, Yamato, in June, July, August and September, 1899, 1900, 1901. All these specimens seem to be referable to *obstructa*, Moore. The oblique white basal band on forewings varies greatly in width and is sometimes immaculate and sometimes suffused with fuscous.

Hitherto unrecorded from Japan.

Local distribution. Hondo.

General distribution. North China; India, Ceylon and Burma; Malacca; Java; Japan.

Collection number, 1124.

Sub-family *CATOCALINAE.*

Genus Spirama.

Guenée, Noct., iii, p. 94 (1852); Hampson, Fauna Brit. India, Moths, ii, p. 552 (1892).

103.

Spirama pudens.

Spirama pudens, Walk., Cat., xiv, p. 1329.
Enmonodia hypopyroides, Walk., Cat., xiv, p. 1333.
Hypopyra persimilis, Moore, Proc. Zool. Soc. Lond., 1877, p. 608.
Spirama pudens, Hampson, Fauna Brit. India, Moths, ii, p. 555.

Hampson records this species from Japan, unrecorded by Leech. One specimen from the island of Tsushima, in the National Collection.

Local distribution. Tsushima.

General distribution. Japan; Andamans; Sumatra; Borneo; Nias.

Genus Nyctipao.

Hübner, Verz., p. 271 (1827); Hampson, Fauna Brit. India, Moths, ii, p. 458 (1894).

104.

Nyctipao macrops.

Phalaena macrops, Linn., Syst. Nat., xii, iii, p. 225 (1768).
Nyctipao macrops, Leech, Trans. Ent. Soc. Lond., 1900, p. 547; Hampson, Fauna Brit. India, Moths, ii, p. 459.

One female specimen taken at Maeda, Iyo, in August, 1896. Hitherto unrecorded from Japan.

Local distribution. Shikoku.
General distribution. Africa; Madagascar; India; Ceylon; Burma; Central and Western China; Japan.
Collection number, 1196.

Genus Catocala.

Schrank, Fauna Boica, ii, 2, p. 158 (1802); Hampson, Fauna Brit. India, Moths, ii, p. 439 (1894).

105.

Catocala rutha, sp. n. (Plate XXX, fig. 3.)

♀. Forewings pale bluish grey, with pale ochreous patches around the reniform stigma; antemedial line black, deeply indented at the median and the submedian nervures, preceded by black band-like clouding; postmedial line black, serrate, angled on costa beyond end of cell, followed by a rust black band, which is interrupted below the middle by an ochreous patch; the outer marginal area is traversed by a serrated black line, and one of the ground colour; fringes grey tipped with whitish between the nervules, and preceded by an ochreous line with whitish dots on it. Hindwings orange yellow with a black stripe along the abdominal fold; antemedial band black, outwardly oblique almost to outer margin then curved to inner margin crossing to abdominal stripe; postmedial band black, with irregular edges, broad on the costa, and very narrow between veins 1 and 2, the inner edge projected inwards towards antemedial band between veins 2 and 3. Underside yellowish; forewings have a sinuous black line and black band on outer margin; hindwings have black markings as on upperside, but the stripe on the abdominal fold is narrower.

Expanse 62 mm.

Female type from Yoshino, Yamato, September, 1899. Allied to *C. connexa*, Butl., but distinguished from that species by the variegated median area of forewings, the less pronounced angulation of the postmedial line and the broad band beyond that line.

Local distribution. Hondo.
Habitat. Japan.
Collection number, 1180.

106.

Catocola fraxini.

Noctua fraxini, Linn., Syst. Nat., x, p. 512 (1758); Staud., Cat. Lep. pal., p. 247 (1901).
Catocola moerens, Fuchs., Jahrb. Nass., xlii, p. 210 (1889) ab. (*et* v. ?).
Catocola gaudens, Staud., Stett. ent. Zeit., p. 56 (1882), var. (*et* ab. ?).

A male specimen received from Mr. Sargent, of Yokohama, which he captured at Kose, Karuizawa, province of Shinano, October, 1895; several other specimens were also taken by him in the same locality, about 4000 ft. elevation.

This specimen may possibly be referable to ab. *moerens*, as Staudinger records this from E. Siberia (Ussuri).

Hitherto unrecorded from Japan.

Local distribution. Hondo.
General distribution. Europe; Armenia; W. and E. Siberia; Ala Tan; Tarbagatia; Japan.
Collection number, 1197.

107.

Catocala hetaera.

Catocala hetaera, Staud., Rom. sur Lép., vi, p. 592, pl. x, fig. 4 (1892); Cat. Lep. pal., i, p. 249, No. 2709 (1901).

Staudinger describes *hetaera* from Ussuri, and also records it from Japan, with a query as to whether it is a variety or a distinct species.

Unrecorded by Leech.

General distribution. E. Siberia (Ussuri); Japan (var. ? or distinct species ?).

Genus Ophiusa.

Ochsenheimer, Eur. Schmett., iv, p. 93 (1816); Hampson, Fauna Brit. India, Moths, ii, p. 493 (1894).

108.

Ophiusa triphaenoides.

Ophiusa triphaenoides, Walk., Cat. Lep. Het., xiv, p. 1358; Hampson, Fauna Brit. Ind., Moths, ii, p. 505 (1894).

A series of nine male and three female specimens taken at Yoshino, Yamato, June, July, August and September, 1895, 1899, 1900, and at Beppu, Bungo, in May, 1893.

My series comprises both very light and very dark specimens.

Hitherto unrecorded from Japan.

Local distribution. Hondo; Kyūshū: May to September.
General distribution. Formosa; N.W. and E. Himalayas; Bengal; W. and S. India; Japan.

Collection number, 1153.

109.

Ophiusa fulvotaenia.

Ophiusa fulvotaenia, Guen., Noct., iii, p. 272; Moore, Lep. Ceyl., iii, pl. clxxi, fig. 1; Hampson, Fauna Brit. India, Moths, ii, p. 504 (1894).

Hampson records this species from Japan, unrecorded by Leech. Not represented from Japan in the National Collection.

General distribution. Japan; China; Formosa; throughout India; Ceylon and Burma; Sumatra; Java.

110.

Ophiusa dotata.

Noctua dotata, Fabr., Ent. Syst., iii, 2, p. 55 (1794).
Ophiusa dotata, Van der Hoev., Lep. Nov., pl. iv, figs. 3, *a*, *b*; Hampson, Fauna Brit. India, Moths, ii, p. 496 (1894).

Four male specimens taken at Iida-San, Higo, in June, 1893.

Hitherto unrecorded from Japan.

Local distribution. KYŪSHŪ.

General distribution. Throughout INDIA; CEYLON and BURMA; JAPAN.

Collection number, 1158.

111.

Ophiusa melicerte.

Noctua melicerte, Drury, Ill. Exot. Ins., i, p. 46, pl. xxiii, fig. 1 (1770); Moore, Lep. Ceyl., iii, pl. clxviii, figs. 2, 2*a*, 2*b* (larva); Hampson, Fauna Brit. India, Moths, ii, p. 494.

Noctua tigrina, Fabr., Spec. Ins., p. 218.

Achaea catella, Guen., Noct., iii, p. 247.

Catocala traversii, Fereday, Trans. N. Z. Inst., ix, p. 457, pl. xvii.

Two male specimens taken at Yoshino, Yamato, in August, 1900, and Tōbetsu, Oshima, August, 1902.

Hitherto unrecorded from Japan.

Local distribution. HONDO; YEZO.

General distribution. ETHIOPIAN, ORIENTAL and AUSTRALIAN REGIONS; JAPAN.

Collection number, 1159.

Sub-Family *MOMINAE.*

Genus MOMA.

Hübner, Verz., p. 203 (1827); Hampson, Moths India, ii, p. 435 (1894).

112.

Moma champa, var. *ainu*. var. nov. (Plate XXX, fig. 19.)

Moma champa, Moore, Proc. Zool. Soc. Lond., p. 403, pl. xxxiii, fig. 2 (1879); Hampson, Moths India, ii, p. 435, fig. 246 (1894); Alph., Rom. sur Lép., ix, p. 158, pl. xiii, fig. 4 (1897); Leech, Trans. Ent. Soc. Lond., p. 525 (1900).

Trichosea champa, Staud., Cat. Lep. pal., p. 130 (1901).

Var. *ainu* differs from the type in having the postmedial line of forewings more distinct. This forms a curve from the costa to below the middle of the wing, thence inwardly oblique to the inner margin. The hindwings are yellowish and broadly bordered with blackish.

Two males and two females from Tōbetsu, June, July, and August, 1903.

Local distribution. KYŪSHŪ (*Leech*); YEZO.
General distribution. INDIA; CEYLON; CENTRAL CHINA; E. SIBERIA; JAPAN.
Collection number, 1042*a*.

Genus PANTHEA.

Hübner, Verz. p. 203 (1827).

113.

Panthea coenobita.

Bombyx coenobita, Esp., Eur. Schmett., iii, pl. xxxvii, fig. 7 (1785).
Panthea coenobita, Staud., Cat. Lep. pal., p. 130 (1901).

Three male and four female specimens taken at the following localities: Junsai Numa and Tōbetsu, province of Oshima, Yezo, May and August, 1903; Yoshino, Yamato, May, June, August, September, 1896, 1899, 1900; Nikko, June, 1896.

One specimen in the National Collection from Japan from the island of Tsushima.

Hitherto unrecorded from Japan.

Local distribution. YEZO; HONDO; TSUSHIMA.
General distribution. EUROPE; JAPAN.
Collection number, 482.

Genus DEMAS.

Stephens, Illust. Brit. Entom. Haust., ii, p. 538 (1828).

114.

Demas umbrosa, sp. n. (Plate XXX, fig. 11.)

♂. Forewings grey suffused with brown on basal two thirds, the outer limit of the suffusion oblique, outer marginal area suffused with fuscous; antemedial line blackish, irregular; postmedial line blackish, wavy, curved round end of the cell; submarginal line wavy, indistinct; reniform and orbicular outlined in blackish. Hindwings and underside fuscous.

Expanse 34 mm.

Smaller than *D. mus.*, Oberth., and the postmedial line is differently formed.

Male type from Japan.

Habitat. JAPAN.

Collection number, 66.

Genus TRISULOIDES.

Butler, Ann. and Mag. Nat. Hist. (5), vii, p. 36 (1881); Hampson, Fauna Brit. India, Moths, ii, p. 436 (1894).

115.

Trisuloides sericea.

Trisuloides sericea, Butl., *l. c.*, p. 36 (1894); Hampson, *l. c.*, p. 436, fig. 247 (1894).

One male and five female specimens taken at Yoshino, Yamato, in July, September and October, 1900, 1901, and at Nakashō, Yamato, in June, 1894; one specimen unlocalised.

Hitherto unrecorded from Japan.

Local distribution. HONDO.

General distribution. INDIA (Sikhim, Shillong); ASSAM; CENTRAL CHINA; JAPAN.

Collection number, 1129.

Sub-family *PLUSIANAE.*

Genus PLUSIA.

Ochsenheimer, Schmett. Eur., iv, p. 89 (1816); Hampson, Fauna Brit. India, Moths, ii, p. 567 (1894).

116.

Plusia limbirena.

Plusia limbirena, Guen., ii, p. 350 (1852); Moore, Lep. Ceyl., iii, pl. clii, fig. 5 (1884); Hampson, Fauna Brit. India, Moths, ii, p. 568 (1894).

Plusia confusa, Moore, Lep. Atk., p. 149.

Four male and two female specimens taken at Yoshino, Yamato, in June, August and September, 1896, 1899, 1900, and at Tōkyo in October, 1895.

Hitherto unrecorded from Japan.

Local distribution. HONDO.

General distribution. St. Helena; S. Africa; Madagascar; Aden; North-west Himalayas; Sikhim; Nilgiris; Ceylon; Japan.

Collection number, 1200.

117.

Plusia daubei.

Plusia daubei, Boisd., Ind. Méth., p. 159 (1829); Hampson, Fauna Brit. India, Moths, ii, p. 572 (1894).

A series of eight male and four female specimens taken at the following localities: Yoshino, Yamato, in September and October, 1899, 1900; Tarumidzu, Ōsumi, September, 1895; Kagoshima, Satsuma, July, 1895; Mamihawa, Higo, October, 1895.

Hitherto unrecorded from Japan.

Local distribution. Hondo; Kyūshū.

General distribution. Europe; Senegal; Congo; Himalayas; Japan.

Collection number, 1210.

Genus Abrostola.

Ochsenheimer, Schmett. Eur., iv, p. 88 (1816).

118.

Abrostola asclepiadis.

Noctua asclepiadis, Schiff., Verz. Schmett., p. 91 (1776).
Abrostola asclepiadis, Staud., Cat. Lep. pal., i, p. 235, No. 2516 (1901).

This species is recorded by Staudinger from Japan; unrecorded by Leech.

General distribution. Europe; E. Siberia (Ussuri); Japan.

Sub-family *NOCTUINAE.*

Genus Sypna.

Guenée, Noct., iii, p. 144 (1852).

119.

Sypna replicata.

Sypna replicata, Feld., Reis. Nov., pl. cxvii, fig. 25; Hampson, Fauna Brit. India, Moths, ii, p. 450 (1894).

Sypna apicalis, Butl., Trans. Ent. Soc. Lond. (1881), p. 206 ; Ill. Het. B. M., vi, pl. iii, fig. 6.
Sypna lucilla, Butl., Trans. Ent. Soc. Lond., p. 206 (1881); Ill. Het. B. M., vi, pl. iii, fig. 8.
Sypna plana, Moore, Lep. Atk., p. 167, pl. v, fig. 24.
Sypna obscurata, Butl., Trans. Ent. Soc. Lond., p. 207 (1881) ; Ill. Het. B. M., vi, pl. iii, fig. 9.
Sypna floccosa, Moore, Lep. Atk., p. 167, pl. v, fig. 23.
Sypna renisigna, Moore, Proc. Zool. Soc. Lond., 1885, p. 25 ; Waterh., Aid., ii, pl. clx, fig. 4.

A female specimen of the form *lucilla*, Butl., taken at Kiire, Satsuma; one male and one female of the form *obscurata*, Butl., taken at Tōkyo, in October, 1893; and at Miyazaki, Hyūga, in September, 1895.

Hitherto unrecorded from Japan.

Local distribution. Hondo; Kyūshū.

General distribution. Dharmsála; Sikhim; Shillong; Tavoy; Japan.

Collection numbers, 1137 and 1140.

Genus Hypocala.

Guenée, Noct., iii, p. 73 (1852); Hampson, Fauna Brit. India, Moths, ii, p. 452 (1894).

120.

Hypocala subsatura.

Hypocala subsatura, Guen., Noct., iii, p. 75 (1852).
Hypocala aspersa, Butl., Proc. Zool. Soc. Lond., 1883, p. 164.
Hypocala subsatura, var. *limbata*, Butl., Ill. Het. B. M., vii, p. 76, pl. cxxxi, fig. 13 (1899); Hampson, Fauna Brit. India, Moths, ii, p. 453, fig. 255 (1894).

One male and one female of the form *aspersa*, Butl., taken at Yoshino, Yamato, in August, 1900, and at Tarumidzu, Ōsumi, in September, 1895.

Hitherto unrecorded from Japan.

Local distribution. Hondo; Kyūshū.

General distribution. North-western and Eastern Himalayas; Sylhet; Western China; Japan.

Collection number, 1143.

121.

Hypocala moorei.

Hypocala moorei, Butl., Ann. and Mag. Nat. Hist. (6), x, p. 21 (1892); Hampson, Fauna Brit. India, Moths, ii, p. 454 (1894).

Hypocala efflorescens, Moore (*nec* Guen.), Lep. Ceyl., iii, pl. clx, figs. 5, 5*a* (1884).

One male specimen taken at Yoshino, Yamato, in July, 1899.

Hitherto unrecorded from Japan.

Local distribution. HONDO.

General distribution. WEST AFRICA; NORTH-WEST HIMALAYAS; SIKHIM; CANARA; CEYLON; WESTERN CHINA; JAPAN.

Collection number, 1144.

Genus AEDIA.

Hübner, Verz., p. 260 (1827).

122.

Aedia leucomelas.

Noctua leucomelas, Linn., Syst. Nat., x, p. 518; Clerck, Icon., pl. i, fig. 2.

Catephia ramburii, Boisd., Ind. Méth., p. 166 (1829).

Catephia leucomelas, Leech, Trans. Ent. Soc. Lond., 1900, p. 555.

One male and three female specimens taken at Makura-zaki, Satsuma, in August, 1895.

Hitherto unrecorded from Japan.

Local distribution. KYŪSHŪ.

General distribution. EUROPE; ASIA MINOR; ARMENIA; PERSIA; NORTH-WEST AFRICA; COREA; JAPAN.

Collection number, 1147.

Genus TRIGONODES.

Guenée, Noct., iii, p. 281 (1852); Hampson, Fauna Brit. India, Moths, ii, p. 527 (1894).

123.

Trigonodes disjuncta.

Trigonodes disjuncta, Moore, Lep. Atk., p. 171; Hampson, Fauna Brit. India, Moths, ii, p. 528, fig. 294 (1894).

A specimen taken in Satsuma province undated. The body of this specimen was unfortunately eaten by ants and the wings only remain, from which it has been identified.

Hitherto unrecorded from Japan.

Local distribution. KYŪSHŪ.

General distribution. BOMBAY; NILGIRIS; JAPAN.

Collection number, 1156.

Genus TOXOCAMPA.

Guenée, Ann. Soc. Ent. Fr., 1841, p. 75; Hampson, Fauna Brit. India, Moths, ii, p. 245, 1894.

124.

Toxocampa stigmata, sp. n. (Plate XXXI, fig. 7.)

♀. Forewings greyish with a faint violet tinge, powdered with brownish, transverse lines and well-defined reniform stigma brown; antemedial line nearly straight, diffuse towards the inner margin; medial line slightly wavy, becoming diffuse below the reniform; postmedial band expanding towards the costa, its outer edge undulated; a series of black dots between the veins on the outer margin, the upper ones preceded by whitish dots; fringes grey. Hindwings fuscous brown. Underside fuscous, outer marginal borders darker.

Expanse 44 mm.

Female type from Hakodate, Yezo (*Andrews*).

Local distribution. YEZO.

Habitat. JAPAN.

Seems to be most nearly allied to *T. dorsigera*, Walk., but is separable from that species by the shape and colour of the stigma.

Collection number, 974.

Genus BREVIPECTEN.

Hampson, Fauna Brit. India, Moths, ii, p. 361 (1894).

125.

Brevipecten consanguis.

Brevipecten consanguis, Leech, Trans. Ent. Soc. Lond., 1900, p. 513.

One male and two female specimens taken at Ōhoki, Iyo, in July, 1896, and at Nakato, Hyūga, in July, 1898. Hitherto unrecorded from Japan.

Local distribution. KYŪSHŪ; SHIKOKU.

General distribution. CENTRAL and WESTERN CHINA; JAPAN.

Collection number, 1113.

Genus ANTARCHAEA.

Hübner, Verz., p. 254 (1827).

126.

Antarchaea bilinealis.

Rivula (?) *bilinealis*, Leech, Trans. Ent. Soc. Lond., 1900, p. 159.

One female specimen from Iteda, province of Awa, September, 1896.

Hitherto unrecorded from Japan.

Local distribution. SHIKOKU.

General distribution. CENTRAL CHINA (Ichang, ♂ type); LOOCHOO ISLANDS (= RYUKYU); JAPAN.

Collection number, 1390.

Genus ZETHES.

Rambur, Ann. Soc. Ent. Fr., 1833, p. 29; Hampson, Fauna Brit. India, Moths, iii, p. 7 (1895).

127.

Zethes suffusa, sp. n.

♂. Forewings pale greyish brown with a pinkish discal suffusion, subbasal line blackish, double, slightly angled below the costa; medial line blackish, zigzag; postmedial line blackish, edged with whitish and marked with ferruginous, especially at end of the cell, where it is elbowed and the white edging dilated; the area beyond the line is tinged with ferruginous towards the costa; submarginal line blackish, dentate; a series of black dots on the outer margin and a blackish dot in the cell between the subbasal and medial lines, a blackish cloud at end of the cell; fringes tinged with ferruginous from the apex to angle of the wing. Hindwings pale greyish brown with indistinct blackish antemedial and submarginal lines, the latter with two black spots on it near anal angle; postmedial line similar to that on the forewings, and of which it appears to be a

continuation. Underside whitish, the forewings suffused with fuscous brown and marked with ferruginous on apical half of the outer marginal area ; blackish discal line and a dusky transverse line on each side of it ; submarginal line and dots as above ; hindwings powdered with fuscous brown, discal mark, and slightly dentate line beyond, blackish.

Expanse 27 mm.

Male type from Eboshi-yama, Ōsumi, September, 1895.

Two male specimens taken at Eboshi-yama and Takakuma-yama, Ōsumi, in September, 1895.

Local distribution. KYŪSHŪ.

Habitat. JAPAN.

Collection number, 1247.

128.

Zethes gensanalis.

Capnodes gensanalis, Leech, Entom., xxii, p. 63, pl. ii, fig. 9 (1889).

Zethes gensanalis, Leech, Trans. Ent. Soc. Lond., 1900, p. 607.

One male specimen from Nikko, taken in August, 1893. Hitherto unrecorded from Japan.

Local distribution. HONDO.

General distribution. COREA ; JAPAN.

Collection number, 1235.

129.

Zethes costaemacula.

Zethes costaemacula, Staud., Stett. ent. Zeit., 1888, p. 282 ; Rom. sur Lép., vi, p. 620, pl. xiii, fig. 9.

Three female specimens taken at the following localities: Haki, Higo, July, 1893 ; Kashiwagi, Yamato, September, 1894 ; Tōkyo, September, 1893.

Hitherto unrecorded from Japan.

Local distribution. HONDO ; KYŪSHŪ.

General distribution. E. SIBERIA (Ussuri) ; JAPAN.

Collection number, 1239.

Genus DIOMEA.

Walker, Cat. Lep. Het., xiii, p. 1109 (1857) ; Hampson, Fauna Brit. India, Moths, iii, p. 23 (1895).

130.

Diomea jankowskii.

Capnodes jankowskii, Oberth., Étud. d'Ent., v, p. 87, pl. ix, fig. 1 (1880); Staud., Rom. sur Lép., vi, p. 608.

Three male and one female specimens taken at Junsai Numa and Tōbetsu, Oshima, in July, 1896, and 1902; at Yoshino and Kashiwagi, Yamato, in August and September, 1894, 1899.

Hitherto unrecorded from Japan.

Local distribution. HONDO; YEZO.
General distribution. E. SIBERIA (Ussuri); JAPAN.
Collection number, 1262.

Genus RAPARNA.

Moore, Lep. Atk., p. 177 (1882); Hampson, Fauna Brit. India, Moths, iii, p. 24 (1895).

131.

Raparna nigripuncta, sp. n.

♂. Pale brown powdered with darker especially on the outer margin. Forewings have blackish discal dot, a submarginal series of black dots, becoming obsolete towards the inner margin, and some black specks on the outer margin. Under surface pale brown suffused with fuscous on the forewings, hindwings have a black discal dot.

Expanse 28 mm.

Male type from Yoshino, Yamato, July, 1899.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 1310.

Genus AVITTA.

Walker, Cat. Lep. Het., xv, p. 1674 (1858); Hampson, Fauna Brit. India, Moths, iii, p. 28 (1895).

132.

Avitta puncta, sp. n. (Plate XXX, fig. 21.)

♂. Forewings brown with a slight greyish suffusion, traversed by five slender black lines, the first two irregular and indistinct towards the costa, the others serrate; reniform stigma represented by a round

black spot, the orbicular punctiform also black. Hindwings fuliginous with brown fringes. Underside brown; hindwings paler from the base to the darker postmedial line, discal dot black.

Expanse 40 mm.

Male type from Ibusuki, province of Satsuma, August, 1894.

Local distribution. KYŪSHŪ.
Habitat. JAPAN.
Collection number, 977.

Sub-family *HYPENINAE.*

Genus COLOBOCHYLA.

Hübner, Verz., p. 344 (1827).

133.

Colobochyla rectilinealis.

Madopa rectilinealis, Graes., Berl. ent. Zeit., 1888, p. 380; Staud., Cat. Lep. pal., i, p. 255, No. 2791 (1901).

This species is recorded by Staudinger from Japan. Unrecorded by Leech.

General distribution. USSURI; NORTH CHINA; JAPAN.

Genus *Adrapsa.*

Walker, Cat. Lep. Het., xvi, p. 169 (1858); Hampson, Fauna Brit. India, Moths, iii, p. 36 (1895.)

134.

Adrapsa reticulatis.

Adraspa (?) *reticulatis*, Leech, Trans. Ent. Soc. Lond., 1900, p. 616.

Two male and nine female specimens taken at Jozanke, near Sapporo, Yezo, in August, 1896.

Leech described the type of this species from a unique female specimen taken in Central China (Chang-Yang).

Hitherto unrecorded from Japan.

Local distribution. YEZO.
General distribution. CENTRAL CHINA; JAPAN.
Collection number, 1271.

135.

Adrapsa ablualis.

Adrapsa ablualis, Walk., Cat. Lep., xvi, p. 170 (1858); Hampson, Ill. Het. B. M., ix, pl. clxvii, fig. 6 (1893).

One male specimen taken at Chiran, Satsuma, August, 1895.

Hitherto unrecorded from Japan.

Local distribution. Kyūshū.
General distribution. Ceylon; Japan.
Collection number, 1399.

Genus Bleptina.

Guenée, Delt. et Pyr., p. 66 (1854); Hampson, Fauna Brit. India, Moths, iii, p. 41 (1895).

136.

Bleptina caliginosa, sp. n.

♂. Fuliginous brown. Forewings tinged with purplish; postmedial line whitish, wavy, hardly traceable towards the inner margin, preceded by a whitish lunule at end of the cell; submarginal line whitish, sinuous, interrupted below the costa; fringes dark greyish brown, preceded by an interrupted black line finely edged outwardly with whitish. Hindwings dark fuliginous paler on the costal area; fringes rather greyer preceded by a black line. Underside of forewings fuliginous grey with traces of postmedial and submarginal lines on the costal area; hindwings whitish grey powdered with fuliginous, curved, diffuse, outer marginal area fuliginous, traversed by a wavy line of the ground colour.

Expanse 28 mm.

Male type from Ishi Kaeva, near Hakodate, June, 1902.

Local distribution. Yezo.
Habitat. Japan.
Collection number, 1282*a*.

137.

Bleptina medialis, sp. n. (Plate XXXI, fig. 30.)

♀. Head and thorax pale whitish brown, abdomen brown marked with blackish. Forewings whitish brown freckled and clouded with darker; antemedial line black indented below the cell and sharply toothed above the inner margin; postmedial line black

dentate, incurved beyond the cell; the space between the lines blackish with a black central shade and discal lunule. Hindwings marked similar to the forewings but the postmedial line is deeply indented above the middle. Underside whitish, a blackish discal lunule and abbreviated central line on forewings, and a discal mark and two curved transverse lines on the hindwings.

Expanse 44 mm.

Female type from Yoshino, Yamato, June, 1899.

Two female specimens taken at Yoshino, in June and July, 1899.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 1288.

Genus MASTIGOPHORUS.

Poey, Lep. Cuba (1832); Hampson, Fauna Brit. India, Moths, iii, p. 47, 1895.

138.

Mastigophorus brevivittalis.

Bertula brevivittalis, Moore, Proc. Zool. Soc. Lond., 1867, p. 87.

Mastigophorus brevivittalis, Hampson, Fauna Brit. India, Moths, iii, p. 49 (1895).

One female specimen received from Mr. Nawa, of Gifu, taken in the vicinity of Gifu, Mikawa.

Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. SIKHIM; KHÁSIS; JAPAN.
Collection number, 1276.

Genus HYDRILLODES.

Guenée, Delt. et Pyr., p. 65 (1854); Hampson, Fauna Brit. India, Moths, iii, p. 53 (1895).

139.

Hydrillodes morosa.

Bleptina morosa, Butl., Ill. Het. B. M., iii, p. 64, pl. lvi, fig. 15 (1879); Hampson, Fauna Brit. India, Moths, iii, p. 54 (1895).

Hydrillodes lentalis, Leech, (*nec* Guen.), Trans. Ent. Soc. Lond., 1900, p. 631.

Described by Butler from Japan.

Two male and one female specimens taken at Kōbe, May, 1899; Tōkyo, April, 1895; Yoshino, Yamato, July, 1899.

This species was recorded from Japan by Leech and referred by him to *Hydrillodes lentalis*, Guen., instead of *morosa*, Butler.

Local distribution. HONDO.

General distribution. CHINA; USSURI; COREA; CEYLON; JAPAN.

Collection number, 1282.

Genus NODARIA.

Guenée, Delt. et Pyr., p. 63 (1854); Hampson, Fauna Brit. India, Moths, iii, p. 56 (1895).

140.

Nodaria obliqua, sp. n. (Plate XXXI, fig. 15.)

♂. Forewings greyish brown with a pale oblique submarginal line; the line is bordered with fuliginous, outwardly near the costa, thence inwardly to inner margin; area beyond the line greyer in colour; discal dot pale ochreous. Hindwings have the basal two-thirds greyish brown, merging into darker brown towards the outer limit; outer third greyish. Fringes greyish with black dots at their base. Under surface of forewings fuscous grey and of hindwings fuscous brown; all the wings have a pale discal dot, but that on the forewings is very minute.

Expanse 32 mm.

Male type from Takakuma-yama, Ōsumi, September, 1895.

A series of one male and three female specimens taken at the following localities: Takakuma-yama, Ōsumi; Ibusuki, Satsuma; Ōsuki and Nishi-no-kawa, Iyo, in July, August and September, 1895, 1896.

Local distribution. KYŪSHŪ; SHIKOKU; July to September.

Habitat. JAPAN.

Collection numbers, 1268*a*, 1268*b*.

141.

Nodaria parallela, sp. n. (Plate XXXI, fig. 16.)

♂. Forewings pale brown with three darker brown transverse lines, the first is indistinct but appears to be slightly curved, the second is angled beyond the cell thence inwardly oblique to the inner margin, the third is almost straight commencing on the costa at one-sixth from apex and slightly bent inwards below the middle. Hindwings whitish brown powdered with darker and traversed by two almost parallel brown lines. Fringes of all the wings preceded by a blackish line. Underside whitish brown; forewings suffused with darker on discal area and traversed by a curved, brown, post-medial line; hindwings suffused with darker on the margins and traversed by two bands as on the upper side.

Expanse 30 mm.

One male and one female specimen. The male described was received from Mr. Andrews, who obtained it at Hakodate, and the female was taken at Yoshino, Yamato, in September, 1899.

There are three unnamed examples of this species in the Leech Collection, now at South Kensington; two from Nagahama in Japan (Hondo), and one from Chang-Yang, in Central China.

Local distribution. Yezo; Hondo.
General distribution. Central China; Japan.
Collection number, 1302.

142.

Nodaria assimilata, sp. n. (Plate XXXI, fig. 11.)

♂. Antennae serrate and fasciculate. Forewings light brown with four darker transverse lines; antemedial line indented below the middle; medial line, erect, diffuse, the discal mark on it; post-medial line curved inwards below the discal mark and then united with the medial line; submarginal line indented below the middle. Hindwings pale whitish brown with two darker transverse lines, the inner one indented. Fringes agree with the wings in colour and are preceded by a dark line. Underside pale whitish brown suffused with ochreous on the costal area of each wing; all the wings have a darker discal mark and two transverse lines.

Expanse 24 mm.

The markings are somewhat similar to those of *N. tarsipennalis*, Treit.

Male type from Junsai Numa, near Hakodate, July, 1902.

Local distribution. YEZO.
Habitat. JAPAN.
Collection number, 1345.

143.

Nodaria discisigna.

Leucinodes discisigna, Moore, Proc. Zool. Soc. Lond., 1883, p. 29.
Nodaria discisigna, Hampson, Fauna Brit. India, Moths, iii, p. 58 (1895).

Two female specimens taken at Nara, Yamato, May, 1899.

Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. SIKHIM; CEYLON; JAPAN.
Collection number, 1252.

144.

Nodaria lecchi.

Nodaria lecchi, South, Entom., xxxviii, p. 74 (1905).
Nodaria fentoni, Leech (*nec* Butler) (part), Trans. Ent. Soc. Lond., 1900, p. 632.

A female specimen from Dorokawa, Yamato, July, 1901.

The type of this species, from Fusan (Corea), is in the British Museum.

Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. COREA; JAPAN.
Collection number, 1293.

Genus CATADA.

Walker, Cat. Lep. Het., xvi, p. 209 (1858); Hampson, Fauna Brit. India, Moths, iii, p. 61 (1895).

145.

Catada fatua.

Catada fatua, Warr., Ann. and Mag. Nat. Hist. (6), viii, p. 65; Hampson, Fauna Brit. India, Moths, iv, p. 542 (1896).

Six male specimens taken at Yoshino, Yamato, in June, July and August, 1899, 1900.

Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. KHÁSIS; JAPAN.
Collection number, 1376.

Genus OLULIS.

Walker, Cat. Lep. Het., xxvii, p. 826 (1863); Hampson, Fauna Brit. India, Moths, iii, p. 65 (1895).

146.

Olulis albistigma.

Zethes albistigma, Hampson, Journ. Bomb. N. H. Soc., ? xi, p. 457 (1897).

Two female specimens taken at Yoshino, Yamato, and at Kōbe, in October and June, 1899, 1903.

Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. KHÁSIS; JAPAN.
Collection number, 1248.

Genus LATIROSTRUM.

Hampson, Fauna Brit. India, Moths, iii, p. 68 (1895).

147.

Latirostrum bisacutum.

Latirostrum bisacutum, Hampson, Fauna Brit. India, Moths, iii, p. 69 (1895).

There is a specimen of this species from Japan in the Washington Museum.

Type in collection Elwes.

Hitherto unrecorded from Japan.

Distribution. MUSSOOREE; SIKHIM; JAPAN.

Genus ANORATHA.

Moore, Proc. Zool. Soc. Lond., 1867, p. 82; Hampson, Fauna Brit. India, Moths, iii, p. 70 (1895).

148.

Anoratha paritalis.

Hypena paritalis, Walk., xvi, p. 65 (1858).
Anoratha paritalis, Moore, Proc. Zool. Soc. Lond., 1867, pl. vi, fig. 10, ♂ ; *id.*, Lep. Ceyl., iii, pl. clxxvi, figs. 7, 7*a*; Hampson, Fauna Brit. India, Moths, iii, p. 70 (1895).

A male specimen from Ōdai-San, province of Yamato, July, 1899.

Hitherto unrecorded from Japan.

Local distribution. Hondo, Ōdai-San (*Wileman*).
General distribution. India (Sikhim, Nilgiris); Ceylon; Japan.

Collection number, 1691.

Genus Licha.

Walker, Cat. Lep. Het., xix, p. 836 (1859).

149.

Licha olivescens.

Marapana olivescens, Hampson, Journ. Bomb. N. H. Soc., xvii, p. 678 (1907).

Three male specimens taken at Yoshino, Yamato, in September, 1899.

Hitherto unrecorded from Japan.

Local distribution. Hondo.
General distribution. S. India; Ceylon; Borneo; Japan.

Collection number, 1255.

Genus Marapana.

Moore, Lep. Ceyl., iii, p. 227 (1885); Hampson, Fauna Brit. India, Moths, iii, p. 71 (1895).

150.

Marapana punctimargo.

Sarcopteron punctimargo, Hampson, Ill. Het. B. M., ix, p. 115, pl. clxvi, fig. 22 (1893).

Marapana punctimargo, Hampson, Fauna Brit. India, Moths, p. 72 (1895).

A male specimen taken at Yoshino, Yamato, May, 1901. Hitherto unrecorded from Japan.

Local distribution. Hondo.
General distribution. S. India; Ceylon; Japan.
Collection number, 1248*a*.

Genus Rhynchina.

Guenée, Delt. et Pyr., p. 20 (1854); Hampson, Fauna Brit. India, Moths, iii, p. 74 (1895).

151.

Rhynchina abducalis.

Hypena abducalis, Walk., Cat. Lep. Het., xvi, p. 66 (1858).
Hypena curviferalis, Walk., Cat. Lep. Het., xxxiv, p. 1510.
Hypena vigens, Butl., Ill. Het. B. M., ii, p. 55, pl. xxxviii, fig. 4 (1878).
Hypena incurvata, Moore, Lep. Atk., ii, p. 189 (1882).
Rhynchina abducalis, Hampson, Fauna Brit. India, Moths, iii, p. 74 (1895).

One male specimen and one female of the typical form taken at Kumamoto, Higo, in May, 1893, and at Tōkyo, in April, 1899; one male and two female specimens of var. *vigens*, Butl., taken at Mifune, Higo, and Nobeoka, Hyūga, in October, 1895; one male of var. *curviferalis*, hitherto unrecorded from Japan by Leech, received from Mr. Nawa, of Gifu.

Local distribution. Hondo; Kyūshū.
General distribution. Japan; throughout India; Andamans; Java; Chusan Islands.
Collection numbers, 1326, 1327, 1328.

Genus Hypena.

Schrank, Fauna Boica, ii, 2, p. 163 (1802); Hampson, Fauna Brit. India, Moths, iii, p. 76 (1895).

152.

Hypena pulverulenta, sp. n. (Plate XXX, fig. 10.)

♂. Head and thorax whitish grey. Forewings whitish grey, powdered with olive brown, and tinged with ochreous on the inner

marginal area; antemedial line oblique, blackish, not clearly defined towards costa, uniting with the obscure, wavy, double postmedial line below vein 2; submarginal line olive brown, broad on costal area where it is outwardly edged with white, the apex of the wing being whitish; apical streak and line brown marked with blackish; fringes grey mixed with darker, preceded by a sinuous blackish line which is only distinct towards the costa. Hindwings fuscous grey, fringes paler with a sinuous blackish line at their base. Under side fuscous brown, on the forewings the submarginal line is indicated by a short blackish streak from the costa, this is outwardly edged with white as also is the costa from the streak to the apex of the wing.

Expanse 28 mm.

One male and one female specimen taken at Gokanoshō, Hyūga, October, 1895. The female measures 26 mm. in expanse.

Collection number, 1320.

153.

Hypena hampsonialis, sp. n.

♂. Head, thorax and forewings violet grey. The forewings are traversed by three darker lines, the antemedial is curved but indistinct, the postmedial is slightly sinuous and outwardly edged with whitish, submarginal line whitish marked with darker, wavy, interrupted; fringes preceded by a series of black dots. Hindwings fuscous grey, fringes preceded by a dark crenulate line. Under surface grey; the submarginal line on the forewings is indicated by white dots; most distinct towards the costa; hindwings have a blackish discal dot and two transverse lines beyond.

Expanse 30 mm.

Male type from Yoshino, Yamato, June, 1899.

In the type the ground-colour of forewings is confined to the inner marginal area, the colour on the other portions of the wing has been changed in some way and is dingy ochreous. There is a fine example of this species, from Japan, in the Natural History Museum at South Kensington.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 1337.

154.

Hypena caliginosa, sp. n.

♂. Head and thorax brownish mixed with ochreous brown, abdomen fuscous. Forewings dark brownish; antemedial line brown edged with pale ochreous, oblique, terminating on vein 1; postmedial line erect, wavy, pale ochreous edged inwardly with brown and with black dots on it at end of the cell and on vein 2; submarginal line indicated by pale ochreous dots and two black ones towards the costa; four pale ochreous dots on the costa between postmedial line and the apex of the wings and a series of whitish dots on the outer margin; fringes dark brownish tipped with grey and preceded by a black line. Hindwings dark fuscous, fringes tipped with grey and preceded by a black line which is interrupted towards the costa. Underside of forewings fuscousbecoming paler towards the base; postmedial line indicated by an ochreous spot on the costa, there are other ochreous dots on the costa towards the apex; hindwings whitish powdered with fuscous, thickly so on the outer marginal area.

Expanse 28 mm.

Male type from Kōbe, March, 1899.

Local distribution. HONDO.

Habitat. JAPAN.

Collection number, 1338.

155.

Hypena furva, sp. n. (Plate XXXI, fig. 17.)

♂. Forewings fuscous brown with a slight greyish suffusion; antemedial line wavy, indistinct; postmedial line rather oblique, ochreous, inwardly edged with black most pronounced at end of the cell and between veins 1 and 2; submarginal line ochreous inwardly edged with black, wavy, indistinct; four ochreous dots on apical portion of the costa; fringes dark grey brown, preceded by a black line and intersected by a thin blackish line. Hindwings dark fuscous brown, fringes preceded and intersected by blackish lines. Under surface fuscous grey, forewings have two white subapical dots and traces of a postmedial line on the costal area, hindwings have a black discal dot and a curved blackish medial line.

Expanse 30 mm.

Male type from Kagoshima, Satsuma, July, 1895.

Allied to *H. minna*, Butl.

Local distribution. KYŪSHŪ.

Habitat. JAPAN.

Collection number, 1358.

156.

Hypena sinuosa, sp. n.

♂. Forewings dark brown tinged with greyish except medial area between the transverse lines; discal dot black; ante- and postmedial lines darker, the former angled below the cell and the latter sinuous; submarginal line dusky, wavy, becoming obscure towards inner margin; three or four ochreous dots on the costa between postmedial line and apex; fringes rather darker than outer marginal area. Hindwings dull brown tinged with greyish. Underside fuscous, four pale dots on costa of forewings before the apex and one between veins 6 and 7; hindwings have a blackish discal mark and traces of a curved transverse line.

Expanse 30 mm.

Male type from Kagoshima, Satsuma, July, 1895.

One male specimen and one female, the latter taken at Makurazaki, Satsuma, August, 1895.

Local distribution. KYŪSHŪ.

Habitat. JAPAN.

Collection number, 1359.

157.

Hypena triangularis.

Hypena triangularis, Moore, Lep. Atk., p. 191 (1879); Hampson, Fauna Brit. India, Moths, iii, p. 90 (1895).

A female of the typical form from Takanabe, Hyūga, taken in September, 1895. A male from Komi, Awa, October, 1896, and another example of the same sex from Mamihara, Higo, October, 1895.

Hitherto unrecorded from Japan.

Local distribution. KYŪSHŪ; SHIKOKU.

General distribution. KHÁSIS; JAPAN.

Collection numbers, 1321, 1336, 1347.

158.

Hypena lignealis.

Hypena lignealis, Walk., Cat. Lep. Het., xxxiv, p. 1138 (1865); Hampson, Fauna Brit. India, Moths, iii, p. 79 (1895).

One male specimen taken at Ishidzuchi-San, August, 1896; another from Mamihara, Higo, October, 1895;

these are referable to the typical form. A third male taken at Ōhoki, Iyo, in July, 1896, is much darker than the others and agrees with examples from the North-west Himalayas in the National Collection at South Kensington.

Hitherto unrecorded from Japan.

Local distribution. Shikoku; Kyūshū.
General distribution. Ceylon; Sikhim; Kulū; Japan.
Collection numbers, 1322, 1323, 1325.

159.

Hypena laxia.

Hypena laxia, Swinhoe, Trans. Ent. Soc. Lond., 1891, p. 483.

One male specimen taken at Yabe, Higo, October, 1895.

This species seems to be distinct from *H. strigosa*, with which it is associated in the National Collection at South Kensington.

Hitherto unrecorded from Japan.

Local distribution. Kyūshū.
General distribution. Khasia Hills; Japan.
Collection number, 1324.

160.

Hypena albopunctalis.

Hypena albopunctalis, Leech, Proc. Zool. Soc. Lond., 1889, p. 557, pl. lii, fig. 10; Trans. Ent. Soc. Lond., 1900, p. 656.

Three male specimens taken at Kiire and Kagoshima, Satsuma, July, 1895, and at Miyazaki, Hyūga, September, 1895.

Hitherto unrecorded from Japan.

Local distribution. Kyūshū.
General distribution. Corea; Central China; Japan.
Collection number, 1361.

161.

Hypena obductalis.

Hypena obductalis, Walk., Cat. Lep. Het., xvi, p. 56 (1858).
Hypena flexuosa, Moore, Lep. Atk., p. 190 (1879).

Bomolocha rhombalis, Alph. (*nec* Walker), Rom. sur Lép., vi, p. 50, pl. ii, fig. 10, ♀ (1892).
Hypena obductalis, Hampson, Fauna Brit. India, Moths, iii, p. 83.

One male specimen taken at Nikko, in August, 1893, and another from Higashi-no-Kawa, province of Iyo, Shikoku.

Hitherto unrecorded from Japan.

Local distribution. Hondo; Shikoku.
General distribution. Simla; Dharmsála; Sikhim; Khásis; Central and Western China; India; Japan.
Collection numbers, 1367, 1370.

162.

Hypena rhombalis.

Hypena rhombalis, Guen., Delt. et Pyr., p. 33 (1854); Hampson, Fauna Brit. India, Moths, iii, p. 83 (1895).
Hypena veronica, Butl., Ill. Het. B. M., vii, p. 85, pl. cxxxiii, fig. 17 (1889).
Hypena perspicua, Leech, Trans. Ent. Soc. Lond., 1900, p. 657.
Hypena obscura, Leech, Trans. Ent. Soc. Lond., 1900, p. 657.

One male and eleven female specimens of *rhombalis*, Guen., taken at the following localities: Jozanke, near Sapporo, and Junsai Numa, Oshima, July and August 1896; Yoshino, Yamato, June, July, August and September, 1894, 1899; Karuizawa, Shinano, July, 1895; Ōhoki and Nishinokawa, Iyo, July, 1896.

Two male specimens of var. *obscura*, described by Leech from Moupin and Omei-shan, taken at Jozanke, near Sapporo, Yezo, and also at Ōyama, Sagami, in May and August, 1894, 1896.

Typical *rhombalis* has been recorded from Japan by Leech, but not var. *obscura*.

Local distribution. Yezo; Hondo; Shikoku; May to September.
General distribution. Sikhim; Khásis; Borneo; Central, Western and Eastern China; Japan.
Collection numbers, 1363, 1365, 1369.

163.

Hypena (?) *inambitiosa.*

Hypena (?) *inambitiosa*, Leech, Trans. Ent. Soc. Lond., p. 660 (1900).

Three male specimens taken at Koya-San, Kishū; Iida-San, Higo and Ōhoki, Iyo, in June, July and September, 1893, 1894, 1896. Antennae bipectinated in the male. Leech described this species from a unique female, taken at Kiukiang, Central China.

Hitherto unrecorded from Japan.

Local distribution. Hondo; Kyūshū; Shikoku.
General distribution. Central China; Japan.
Collection number, 1167.

Genus Paragona.

Staudinger, Rom. sur Lép., p. 557 (1892).

164.

Paragona cleorides, sp. n.

♂. Forewings whitish thickly powdered and clouded with dark grey; ante- and postmedial lines black, the former angled about the middle and the latter wavy and angled below the costa; medial line ferruginous, the area between it and the postmedial tinged with ferruginous; submarginal line blackish, wavy, but indistinct; discal lunule and marginal line black, the latter with black dots on it. Hindwings similar to the forewings, but the antemedial line is absent, the postmedial is not angled, the ferruginous line runs from the lower edge of the discal mark to the inner margin. Fringes of all the wings whitish. Underside of forewings fuscous and of hindwings whitish, both with very faint traces of the transverse lines.

Expanse, 20 mm.

Male type from Jozanke, near Sapporo, Yezo, August, 1896.

Another male taken at Junsai Numa, Oshima, in July, 1902.

Two specimens in the National Collection from Tōkyo and Hakodate.

Local distribution. Yezo; Hondo.
Habitat. Japan.
Collection number, 692.

Genus Rivula.

Guenée, Dup., Cat. Lep. Eur., p. 206 (1844); Hampson, Fauna Brit. India, Moths, ii, p. 334 (1894).

165.

Rivula angulata, sp. n.

♂. Head and thorax whitish. Forewings whitish tinged with pink and clouded with brownish; antemedial line brownish, bidentate on costal area, thence inwardly oblique and slightly wavy to the inner margin; postmedial line white, edged and shaded inwardly with brownish, outwardly oblique to just beyond the end of cell, thence inwardly oblique to the inner margin; a brownish cloud beyond the postmedial and from this there is a waved, dusky line to the inner margin where it terminates in a small brownish cloud; fringes brownish preceded by an interrupted black line which is extended along the costa to the brownish cloud. Hindwings fuscous with traces of a darker medial line, fringes paler with an interrupted black line at their base. Under surface whitish ochreous; forewings suffused with blackish on the basal two thirds; hindwings speckled with brownish, a black discal dot and traces of a dark central line.

Expanse, 20 mm.

Male type from Yoshino, Yamato, August.

A series of eight male and two female specimens taken at Yoshino, Yamato, in May, June, July and August, 1900. Expanse of series, 20 mm. ♂ to 22 mm. ♀.

Local distribution. Hondo.

Habitat. Japan.

Collection number, 1250.

166.

Rivula biatomea.

Rivula biatomea, Moore, Proc. Zool. Soc. Lond., p. 29 (1883); Hampson, Fauna Brit. India, Moths, ii, p. 335 (1894).

One male and two female specimens taken at Taniyama, Satsuma, in July, 1895, and at Miyazaki, Hyūga, in September, 1895.

Hitherto unrecorded from Japan.

Local distribution. Kyūshū.

General distribution. Nilgiris; Ceylon; Japan.

Collection number, 1379.

167.

Rivula confusa, sp. n.

♂. Forewings pale whitish brown powdered with darker; ante- and postmedial lines indicated by whitish oblique streaks on the costa; a black dot at upper angle of the cell and a minute black speck at the lower angle, some white dots on apical third of the costa, a white marginal line preceded by some blackish dashes. Hindwings pale fuscous, fringes preceded by a blackish line. Underside whitish; forewings suffused with reddish brown, some white dots on the costa towards apex and a white subapical spot; hindwings suffused with fuscous on the outer marginal area, postmedial line dusky.

Expanse 20 mm.

Male type from Tarumidzu, Ōsumi, September, 1895.

Local distribution. KYŪSHŪ.
Habitat. JAPAN.
Collection number, 1384.

168.

Rivula nigripunctalis, sp. n.

♂. Forewings pale ochreous brown, a black dot at outer extremity of cell and some smaller black dots on the costa; subbasal line indicated by a black dot on the costa; ante- and postmedial lines blackish, crenulate, originating in black dots on the costa; submarginal line blackish, wavy, a blackish dot on it opposite end of cell, and another between veins 3 and 4; fringes of the ground colour preceded by an interrupted black line. Hindwings paler, discal dot black. Under surface of forewings pale fuscous brown, some black dots on the apical third of costa; of hindwings whitish powdered with fuscous brown on costal area, a black discal dot and traces of a dusky transverse line beyond.

Expanse 18 mm.

Male type from Yoshino, Yamato, June, 1900.

Seven male and five female specimens taken at Yoshino, Yamato, in June, July, August and October, 1895, 1899, 1900, and at Mifune, Higo, in October, 1895.

Expanse of series, 15 mm. ♂, to 18 mm. ♀.

Local distribution. HONDO; KYŪSHŪ.
Habitat. JAPAN.
Collection number, 1709.

169.

Rivula curvilinea, sp. n. (Plate XXXI, fig. 18.)

♂. Forewings whitish suffused with brown, especially on the costal and outer marginal areas; a black mark at outer extremity of the cell, placed on the edge of a blackish curved line from costa to the blackish postmedial line, the latter is almost parallel with the outer margin and is outwardly edged with whitish; submarginal band blackish narrowing towards the inner margin; fringes preceded by a blackish line. Hindwings fuscous. Underside of forewings fuscous; of hindwings whitish tinged with fuscous, a dusky discal dot and a curved postmedial line.

Expanse 20 mm. Expanse of series, 17 mm. ♂, 22 mm. ♀.

Male type from Yoshino, Yamato, September.

Five male specimens and one female taken at Yoshino, Yamato, in July, August, September and October, 1899, at Iida-San, Higo, in May, 1894.

Local distribution. HONDO; KYŪSHŪ.
Habitat. JAPAN.
Collection number, 1713.

170.

Rivula errabunda, sp. n.

♂. Forewings greyish brown powdered with dark brown, a white mark about middle of the costa and four white dashes nearer the apex; medial line brown, not clearly defined but appears to be outwardly oblique from white mark on the costa to the upper of two black dots at end of the cell, thence inwardly oblique to the inner margin; postmedial line brown, its course from costa to vein 6 not traceable but from this point to near vein 1 it is inwardly oblique, thence straight to inner margin; fringes ochreous brown at base, whitish at tips, preceded by a white line with black dots on it. Hindwings fuscous grey, fringes ochreous brown tipped with greyish, preceded by a blackish line. Underside fuliginous, the costa of forewings with white marks as above, the inner marginal area of all the wings whitish.

Expanse 18 mm.

Male type from Yoshino, Yamato, July, 1900.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 1739.

Family LYMANTRIADAE.

Genus DASYCHIRA.

Stephens, Ill. Brit. Ent., Haust., ii, p. 58 (1829); Hampson, Fauna Brit. India, Moths, i, p. 447 (1892).

171.

Dasychira conjuncta, sp. n.

♂. Forewings grey, clouded with darker on the basal and outer marginal areas; antemedial line blackish inwardly oblique, elbowed at costa; postmedial line blackish, curved and recurved to just below vein 2 where it is connected with antemedial by a black bar, thence outwardly oblique to near the outer angle; marginal line blackish, crenulate, commencing at apex and projected inwards on vein 2; there are indications of a whitish, serrated, submarginal line; fringes grey variegated with paler at the ends of the nervules. Hindwings fuscous with blackish discal dot and marginal line; fringes pale grey flecked with darker between the nervules. Underside whitish tinged with fuscous especially on the forewings; all the wings have a dusky discal spot and postmedial line.

Expanse 42 mm.

Male type from Yoshino, Yamato, June, 1900.

A series of eleven male specimens taken at Yoshino, Yamato, in June, 1895, 1899, 1900 and 1901. The series shows but little variation in colour and varies in expanse from 38 mm. to 42 mm. I have never taken a female.

Local distribution. HONDO.

Habitat. JAPAN.

Collection number, 217.

172.

Dasychira nigra.

Selca nigra, Hampson, Journ. Bombay Nat. Hist. Soc., xi, p. 440 (1897); Swinhoe, Trans. Ent. Soc. Lond., 1903, p. 469.

Twenty-one male specimens taken in the following localities: Yoshino, Yamato, June, July, August and September, 1899, 1900; Tōbetsu and Shiokubi, Oshima, Yezo, July and August, 1902, 1903.

Hitherto unrecorded from Japan.

Local distribution. HONDO; YEZO.

General distribution. SIKHIM (type); JAPAN.

Collection number, 144.

173.

Dasychira strigata.

Dasychira strigata, Moore, Lep. Atk., p. 58 (1879); Hampson, Fauna Brit. India, Moths, i, p. 449 (1892).
Dasychira nivcosparsa, Butl., Ill. Het. B. M., v, p. 59, pl. 91, fig. 7.

Four male specimens taken at Yoshino, Yamato, in June and September, 1899, 1900; and one female taken at Tōkyo, October, 1893.

Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. INDIA (Simla, Sikhim); Japan.
Collection numbers, 216 and 216*a*.

174.

Dasychira virginea.

Dasychira virginea, Oberth., Diagn., p. 7; Étud. d'Ent., v, p. 33, pl. i, fig. 9 (♀), pl. v, fig. 5 (♂); Staud., Rom. sur Lép., vi, p. 307.

Two male specimens and one female all bred from the larva at Tōkyo, May, 1895.

Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. E. SIBERIA (Ussuri); Japan.
Collection numbers, 212 and 214.

Genus EUPROCTIS.

Hübner, Verz., p. 159 (1827); Hampson, Fauna Brit. India, Moths, i, p. 470 (1892).

175.

Euproctis curvata, sp. n. (Plate XXXI, fig. 4.)

♀. Head and thorax yellow, abdomen pale brown with darker anal tuft. Forewings yellow with a brownish central band which is interrupted by the venation, does not extend to the costa, and is curved beyond the cell; a brownish mark on the inner margin between the central band and the base of the wing. Hindwings whitish with some yellowish hairs on the abdominal area towards the base. Under surface whitish.

Expanse 48 mm.

Near *E. inconspicua*, Leech.

Female type from Yoshino.

A series of three male specimens and one female taken at Yoshino, Yamato, in July, 1900 and 1901, and at Kiire, Satsuma, in July, 1895.

The series measures in expanse 32 mm. ♂ to 48 mm. ♀.

Local distribution. HONDO; KYŪSHŪ.

Habitat. JAPAN.

Collection number, 230.

176.

Euproctis aurata, sp. n. (Plate XXX, fig. 13.)

♂. Forewings pale yellow with an orange irregular basal patch and a central band, the shape of these markings somewhat similar to those of *E. subflara*, Brem. Hindwings paler than the forewings. Underside paler than above.

Expanse 30 mm.

A male specimen taken at Ishidzuchi-San, Iyo, August, 1896.

Local distribution. SHIKOKU.

Habitat. JAPAN.

Collection number, 232.

177.

Euproctis torasan.

Artaxa torasan, Holl., Trans. Amer. Ent. Soc., xvi, p. 78 (1889); Leech, Trans. Ent. Soc. Lond., 1899, p. 140.

Leech records the description of this species from Japan, but had no specimens. One male and one female specimen taken at Kumamoto, Higo, in May, 1893, and also in the province of Tosa, May, 1893.

When in Pittsburgh, Pa., in 1900, Professor Holland showed me his type of *Artaxa torasan*, which is a male. I recognised it as a species which I had captured but not named. My male specimen agrees well with Dr. Holland's description, which I herewith append. "♂. Uniformly of a bright orange red. The upper surface of the posterior wings slightly clouded on the disc by fuscous. A small dash of obscure brown on the under surface of primaries behind the costal margin of the apex. Expanse of wings, 22 mm. Type from Shirakawa; Uzen, July, 1887."

Local distribution. HONDO; KYŪSHŪ; SHIKOKU.

Habitat. JAPAN.

Collection number, 237.

Family SPHINGIDAE.

Sub-family *ACHERONTIANAE.*

Genus ACHERONTIA.

Ochsenheimer, Schmett. Eur., iv, p. 44 (1816); Rothschild and Jordan, Rev. Lep. Sphing., Nov. Zool. ix, suppl., p. 16 (1903).

178.

Acherontia lachesis.

Sphinx lachesis, Fabr., Ent. Syst., Suppl., p. 434 (1798).
Acherontia morta, Hübn., Verz. Schmett., p. 140 (1822?); Leech, Trans. Ent. Soc. Lond., p. 119 (1889); Swinhoe, Cat. Lep. Het. Oxford, p. 31 (1892).
Acherontia satanas, Boisd., Spec. Gén. Lép., i, pl. xvi, fig. 1 (1836).
Acherontia lethe, Westw., Cab. Orient. Ent., p. 88, pl. xlii, fig. 3 (1848).
Acherontia lachesis, Hampson, Fauna Brit. India, Moths, i, p. 67 (1892); Leech, Trans. Ent. Soc. Lond., 1898, p. 275; Rothsch. and Jord., Rev. Lep. Sphing., Nov. Zool. ix, suppl., p. 17 (1903).
Manduca lachesis, Kirby, Cat. Lep. Het., p. 700 (1892).

One male and one female specimen taken at Sakurajima, Ōsumi, in August, 1899.

Hitherto unrecorded from Japan. There is, however, one specimen in the national collection labelled "Japan fide Lewis, loc. err."

Local distribution. KYŪSHŪ.

General distribution. Throughout INDIA and CEYLON; SIAM; PENANG; JAVA; CENTRAL and WESTERN CHINA; JAPAN.

Collection number, 15.

Rothschild and Jordan remark, "Not yet found in N.W. India and Japan."

Genus HYLOICUS.

Hübner, Verz., p. 138 (1827); Rothschild and Jordan, Rev. Lep. Sphing., Nov. Zool., ix, suppl., p. 116 (1903).

179.

Hyloicus crassistriga.

Kentrochrysalis streckeri, Leech (*nec* Staudinger, 1880), Trans. Ent. Soc. Lond., 1898, p. 290 (part).

Hyloicus crassistriga, Rothsch. and Jord., Rev. Lep. Sphing., Nov. Zool., ix, suppl., pp. 144, 833 (1903).

Originally referred by Leech to *K. streckeri*, Staud.; re-described by Rothschild and Jordan under the name of *crassistriga*. They remark under the heading of *Kentrochrysalis sieversi* (*l. c.*, p. 164) : "The specimen of *streckeri*, which Leech referred to as being darker than *sieversi* (Trans. Ent. Soc. Lond., 1898, p. 290), and which apparently convinced him of the specific identity of *streckeri* and *sieversi*, was not *streckeri* at all, but the new *Hyloicus* described on p. 144 of this paper" (referring, of course, to *Hyloicus crassistriga*).

Type ♀ ex coll. Leech in British Museum.

Recorded from Japan by Rothschild and Jordan, but not by Leech.

Local distribution. (Hondo, Yokohama?)

Genus Dolbina.

Staudinger, Rom. sur Lép., iii, p. 155 (1887); Rothschild and Jordan, Rev. Lep. Sphing., Nov. Zool., ix, suppl., p. 159 (1903).

180.

Dolbina exacta.

Dolbina tancrei, Staud., Rom. sur Lép., iii, p. 155 (1887) (part).

Dolbina inexacta, Fixsen (*nec* Walker, 1856), Rom. sur Lép., iii, p. 320 (1887); Leech, Trans. Ent. Soc. Lond., 1898, p. 289.

Pseudosphinx inexacta, Graeser, Berl. Ent. Zeit., xxxii, p. 104 (1888); Leech. Proc. Zool. Soc. Lond., 1888, p. 588 (part).

Dolbina exacta, Staud., Rom. sur Lép., vi, p. 222, t. 4, fig. 1 (♂) (1892); Kirby, Nov. Zool., i, p. 102 (1894); Bartel, Rühl, Grosschm. ii, p. 29 (1899); Staud., Cat. Lep. pal., p. 101 (1901); Rothschild and Jordan, Rev. Lep. Sphing., Nov. Zool., ix, p. 161 (1903).

Recorded by Rothschild and Jordan from Japan, but not by Leech. They remark: "Larva said by Graeser, *l. c.*, to be very similar to, and the pupa not distinguishable from that of *Sphinx ocellata*." "Food plants: *Syringa* and *Fraxinus*. Two broods."

A male specimen from Tōbetsu, Oshima, Yezo, taken in July, 1902, and a female from Ishikawa, Oshima, taken in June of the same year.

Local distribution. YEZO.

General distribution. E. SIBERIA (Amurland, Ussuri); COREA; JAPAN.

Collection number, 39.

Genus KENTROCHRYSALIS.

Staudinger, Rom. sur Lép., iii, p. 157 (1887); Rothschild and Jordan, Rev. Lep. Sphing., Nov. Zool., ix, suppl., p. 162 (1903).

181.

Kentrochrysalis consimilis.

Hyloicus davidis, Butler (*nec* Oberthür, 1880), Trans. Ent. Soc. Lond., 1881, p. 2, Tōkyo.

Anceryx davidis, Leech, Proc. Zool. Soc. Lond., 1888, p. 589 (part).

Kentochrysalis streckeri, Kirby, Cat. Lep. Het., i, p. 693 (1892) (part); Leech, Trans. Ent. Soc. Lond., 1898, p. 290.

Kentochrysalis consimilis, Rothsch. and Jord., Rev. Lep. Sphing., Nov. Zool., ix, suppl., pp. 164, 834.

The correct spelling of the name of this genus is *Kentrochrysalis*, not *Kentochrysalis*.

Leech referred three specimens which were contained in Pryer's collection to *Kentrochrysalis streckeri*, Staud.; Rothschild and Jordan, however, have included two of these specimens under their new species *consimilis*, and the third specimen, a female, has been named by them *Hyloicus crassistriga*. They remark concerning *consimilis* that "it is intermediate between *streckeri* and *sieversi*, but different from both; of the size of *streckeri*, with which it has generally been confounded. In appearance like *streckeri*, but the external discal lines of the forewing less dentate, the two antemedian lines distinct, ending at

inner margin in a blackish patch which is prolonged basad."

Type ♂ (? in Tring Museum).

Four male specimens; Nikko, August, 1893; Karuizawa, Shinano, July or August, 1895; one unlocalised.

Local distribution. Hondo, Chiuzenji (*Lewis*), Tōkyo, Nikko (B. M.).

Habitat. Japan.

Recorded from Japan by Rothschild and Jordan, but not by Leech.

Collection number, 38.

Sub-family *AMBULICINAE.*

Genus Marumba.

Moore, Lep. Ceyl., ii, p. 8 (1882). Rothschild and Jordan, Rev. Lep. Sphing., Nov. Zool., ix, suppl., p. 266 (1903).

182.

Marumba jankowskii.

Smerinthus jankowskii, Oberth., Étud. d'Ent., v., p. 26, pl. vi, fig. 1, 1881; Staud., Rom. sur Lép., vi, p. 233 (1892).

Marumba jankowskii, Rothsch. and Jord., Rev. Lep. Sphing., Nov. Zool., ix, suppl., p. 279 (1903).

One male and one female specimen taken at Hakodate, Oshima, in July, 1896 and 1903. Hitherto unrecorded from Japan.

Local distribution. Yezo.

General distribution. E. Siberia (Amurland, Ussuri, Suifun); Japan.

Collection number, 24.

Genus Langia.

Moore, Proc. Zool. Soc. Lond., p. 567 (1872); Hampson, Fauna Brit. India, Moths, i, p. 73 (1892); Rothschild and Jordan, Rev. Lep. Sphing., Nov. Zool., ix, suppl., p. 291 (1903).

183.

Langia zenzeroides.

Langia zenzeroides, Moore, Proc. Zool. Soc. Lond., 1872, p. 567; Hampson, Fauna Brit. India, Moths, i, p. 73, fig. 45 (1892).

Langia khasiana, Moore, Proc. Zool. Soc. Lond., 1872, p. 568.

Langia zenzeroides, var. *nawai*, Rothsch. and Jord., Rev. Lep. Sphing., Nov. Zool., ix, suppl., p. 292 (1903).

Langia zenzeroides, var. *nawae*, Rothsch., Nagano, in Nawa's Icones Jap. Insect., i, p. 5, pl. ii, fig. 5, *a*, *b* (larva), *c* (pupa), (1904).

When collecting in the vicinity of Hiko-San in Buzen Kyūshū, I observed several specimens of variety *nawae*, in the collection of Viscount Takachiho, who had captured them in the neighbourhood. He kindly presented me with two male specimens, taken in April, 1890 and 1893. One specimen agrees very well with the figure given on plate ii of Nawa's "Icones Japonicorum Insectorum," the other is lighter in colour. In this latter specimen the dark brown and whitish lines near anal angle of wing are wanting and an angulated antemedial line is present, which is absent both in Hampson's and Nagano's figures.

Type of var. *nawae*, ♀.

Recorded from Japan by other authors, but not by Leech.

Local distribution. Hondo; Kyūshū.

General distribution. Simla; Dharmsála; Sikhim; Khásis; Assam; Yannaw; S. China; Japan.

Collection number, 22.

Genus Amorpha.

Hübner, Tentam., p. 1 (1806), Rothschild and Jordan, Rev. Lep. Sphing., Nov. Zool., ix, suppl., p. 332 (1903).

184.

Amorpha amurensis.

Sphinx tremulae, Boisd. (*nec* Borkhausen, 1793), Ind. Méth., p. 34 (1829); Fisch. Orzet. Mosc., pl. *x*, figs. 1, 2 (1830).

Smerinthus tremulae, Treitschke, Schm. Eur., x, i, p. 140 (1834).

Smerinthus tremulae, var. *amurensis*, Staud., Rom. sur Lép., vi, p. 232 (1892); Cat. Lep. pal., p. 99 (1901).

Amorpha amurensis, Rothsch. and Jord., Rev. Lep. Sphing., Nov. Zool., ix, suppl., p. 336 (1903); *id.*, var. *sinica*, *l. c.*, p. 336.

Three male and two female specimens of *amurensis* taken at Tōbetsu and Hakodate, Oshima, Yezo, July, August, 1896, 1902, 1903.

Hitherto unrecorded from Japan.

Local distribution. Yezo.

General distribution. Europe; E. Siberia (Ussuri, Amurland); Japan.

Collection number, 20.

Genus Ampelophaga.

Bremer and Grey, Motsch. Étud. d'Ent., i, p. 61 (1852); Rothschild and Jordan, Rev. Lep. Sphing., Nov. Zool., ix, suppl., p. 515 (1903).

185.

Ampelophaga rubiginosa.

Ampelophaga rubiginosa, Brem. and Grey, *l. c.*; Schmett., Nörd. China, p. 11, pl. iv, fig. 1 (1853); Hampson, Fauna Brit. India, Moths, i, p. 83, fig. 52 (1892); Leech, Trans. Ent. Soc. Lond., 1898, p. 281.

Chaerocampa rubiginosa, Mén., Cat. Mus. Petr., ii, p. 91, pl. xii, fig. 2 (1857).

Deilephila romanovi, Staud., Rom. sur Lép., iii, p. 158, pl. ix, figs. 1 *a*, *b* (1887).

Acosmeryx iyenobu, Holl., Trans. Amer. Ent. Soc., xvi, p. 71 (1889); Leech, Trans. Ent. Soc. Lond., 1898, p. 282; Rothsch. and Jord., Rev. Lep. Sphing., Nov. Zool., ix, suppl., pp. 518, 885 (1903).

Ampelophaga fasciosa, Moore, Proc. Zool. Soc. Lond., 1888, p. 391; Butler, Ill. Het. B. M., vii, pl. 121, fig. 3.

When on a visit to Pittsburgh, Pa., Professor Holland kindly showed me his type of *Acosmeryx iyenobu*, and I made a note at the time that it was probably a small-sized specimen of *A. rubiginosa*, Brem. and Grey. I find

that this opinion is corroborated by Rothschild and Jordan, who include *iyenobu* under the synonymy of *A. rubiginosa* in their "Revision of the Lepidopterous Family Sphingidae." *Rubiginosa* and *iyenobu* are both mentioned by Leech in his catalogue from Japan as distinct species, but he remarked that he had not seen the latter.

A series of nine male specimens and one female taken at Tōkyo in June, July and August. The female specimen agrees exactly with Holland's description of *iyenobu*.

Other recorded localities for the species in Japan are Yokohama (April, August, and September); Mukoyama (July); Oiwake; and Hakodate (June and July).

Local distribution. YEZO; HONDO.
General distribution. AMURLAND; CHINA; JAPAN.
Collection number, 26.

Sub-family *MACROGLOSSINAE.*

Genus ACOSMERYX.

Boisduval, Spec. Gén. Lép. Hét., i, p. 214 (1875); Rothschild and Jordan, Rev. Lep. Sphing., Nov. Zool., ix, suppl., p. 526 (1903).

186.

Acosmeryx castanea.

Acosmeryx anceus, Leech (*nec* Cramer, 1781), Proc. Zool. Soc. Lond., 1888, p. 585 (part); Kirby, Cat. Lep. Het., i, p. 648 (1892) (part); Leech, Trans. Ent. Soc. Lond., 1898, p. 281 (part, Yokohama; Kiukiang, vii).
Acosmeryx castanea, Rothsch. and Jord., Rev. Lep. Sphing., Nov. Zool., ix, suppl., p. 531 (1903); Nagano, in Nawa's Icones Japonicorum Insectorum, p. 8, pl. iv, fig. 1 *a*, *b* (larva), *c* (pupa), (1904).

Nine male specimens and one female taken at Tōkyo and Yokohama in May, June and July, 1894.

Local distribution. YEZO; HONDO.

Type, in Tring Museum (Yokohama, June, 1896). Originally referred to *anceus*, Cramer, by Leech, but redescribed as a new species from Japan by Rothschild and Jordan.

Collection number, 27.

Sub-family *PERGESINAE.*

Genus CECHENENA.

Rothschild and Jordan, Rev. Lep. Sphing., Nov. Zool., ix, suppl., p. 799 (1903).

187.

Cechenena minor.

Chaerocampa minor, Butler, Proc. Zool. Soc. Lond., 1875, p. 249 ; *id.*, Trans. Zool. Soc. Lond., ix, p. 562 (1877) : Cotes and Swinh., Cat. Moths, India, i, p. 19 (1887) ; Swinh., Cat. Lep. Het. Mus. Oxf., i, p. 18 (1892).

Theretra minor, Kirby, Cat. Lep. Het., i, 656 (1892); Rothsch., Nov. Zool., i, p. 75 (1884) (= *lineosa* exterr.).

Chaerocampa lineosa, Hampson, Fauna Brit. India, Moths, i, p. 93 (1892) (part).

Theretra lineosa, Dudgeon, Journ. Bomb. N. H. Soc., xi, p. 412 (1898) (part); Leech, Trans. Ent. Soc. Lond. (1898), p. 284.

Theretra striata, Rothsch., *l. c.*, i, p. 76 (1894) (Japan, Mus. Tring); Leech, Trans. Ent. Soc. Lond., 1898, p. 285.

Cechenena minor, Rothsch. and Jord., Rev. Lep. Sphing., Nov. Zool., ix, suppl., pp. 802, 933 (1903), Nagano, in Nawa's Icones Insect. Japon., p. 15, pl. v, fig. 4 (1904).

Mentioned by Leech under the name of *striata* in his Catalogue. Previously described from Japan by Rothschild under the name of *Theretra striata*, and now referred to *C. minor*, Butler.

General distribution. SIKHIM ; BHUTAN ; KHASIA HILLS ; SHILLONG ; FORMOSA ; JAPAN.

Family CYMATOPHORIDAE.

Genus THYATIRA.

Hübner, Verz., p. 236 (1827); Hampson, Fauna Brit. India, Moths, ii, p. 180 (1892).

188.

Thyatira flavida.

Thyatira flavida, Butler, Cist. Ent., iii, p. 131 (1885); Leech, Trans. Ent. Soc. Lond., 1900, p. 11.

Thyatira oblonga, Pouj. Ann. Soc. Ent. Fr., 1887, p. 49.

Four male and three female specimens taken at Tōbetsu, Oshima province, Yezo, in August, 1902.

The type (female) of Butler from Hakodate and a specimen from Ichang, Central China, are named "*flavescens*" in the National Collection. There is, however, apparently no species which has been described by Butler from Japan under the name *flavescens*, and the description given by Butler for *flavida* agrees exactly with the specimens labelled *flavescens*.

Local distribution. YEZO.

General distribution. CENTRAL CHINA (Ichang); WESTERN CHINA (Omei-shan, Wa-ssu-kow); JAPAN.

Genus POLYPLOCA.

Hübner, Verz., p. 273 (1827): Hampson, Fauna Brit. India, Moths, i, p. 182 (1892).

189.

Polyploca albicostata.

Cymatophora albicostata, Brem. Lep. Ost.-Sib., p. 47, pl. v., fig. 6 (1864).

Polyploca albiscostata, Leech, Trans. Ent. Soc. Lond., 1900, p. 16.

Two male specimens, one taken at Tōbetsu, Oshima, in July, 1902, and the other received from Mr. Andrews, Hakodate.

Hitherto unrecorded from Japan.

Local distribution. YEZO.

General distribution. E. SIBERIA (Amurland, Ussuri); COREA; WESTERN CHINA; JAPAN.

Collection number, 812.

Genus NEMACEROTA.

Hampson, Fauna Brit. India, Moths, i, p. 185 (1892).

190.

Nemacerota umbrosa, sp. n.

♂. Forewings dark fuscous grey on basal and outer thirds, median area pale brownish dusted with darker; discal dot blackish, followed by a transverse fuscous shade; the outer limit of basal third is diffuse and the outer third is traversed by a pale line originating in a

whitish apical mark, the internal edge of the outer third is marked with whitish on the costal area. Hindwings fuscous with traces of a paler medial band. Underside pale fuscous; forewings with a post-medial band, and hindwings with a medial band, paler.

Expanse 34 mm.

Male type from Junsai Numa, Oshima, July, 1902.

Local distribution. Yezo.

Habitat. Japan.

Collection number, 997*a*.

Genus Palimpsestes.

Hübner, Verz., p. 273 (1827).

191.

Palimpsestes undosa, sp. n. (Plate XXX, fig. 20.)

♀. Head and collar brown, thorax brown mixed with grey; abdomen fuscous grey. Forewings greyish-white suffused with brownish except on the costal area, black subbasal line; antemedial band greyish brown, broad, traversed by a double curved black line, preceded by a black wavy line which becomes indistinct towards the costa, and followed by a double, sinuous, black line; postmedial line black, crenulate, slightly curved; submarginal line pale, a brownish spot at its costal extremity, and a short blackish dash from it to the apex of the wing; discal mark black, linear; fringes grey tinged with golden brown at their base and preceded by a brown line. Hindwings pale fuscous, fringes paler. Underside pale fuscous, indications of a curved postmedial line on the forewings and of two curved lines on the hindwings.

Expanse 40 mm.

Female type from Dorokawa, Yamato, August, 1894.

The specimen figured by Oberthür (Étud. d'Ent., v, pl. iii, fig. 2) as *Cymatophora ampliata*, Butl., is probably referable to the species now described, which differs from Butler's species in the transverse lines.

Local distribution. Hondo.

Habitat. Japan.

Collection number, 803.

192.

Palimpsestes basalis, sp. n. (Plate XXX, fig. 24.)

♀. Head and thorax brown, edges of patagia darker. Forewing whitish grey, tinged with fuscous on outer third; basal area, limited

by a black obtusely angled line, brownish, darker on costal portion; some long black scales on median nervule, and the stigmata are represented by tufts of white scales, with some black scales at lower end of the reniform; postmedial line black, wavy, excurved to vein 2, thence straight to inner margin, this line is most distinct on the costa, and is followed by a wavy pale-edged dusky line; antemarginal line whitish, wavy; fringes grey tipped with darker and preceded by a dark line. Hindwing whitish grey suffused with fuscous; median line blackish, double, indistinct. Underside whitish grey, the forewings suffused with fuscous, the hindwings have median line as above.

Expanse 50 mm.

Female type from Nikko, July, 1893.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 810.

Family EUPTEROTIDAE.

Genus GANGARIDES.

Moore, Proc. Zool. Soc. Lond., 1865, p. 821; Hampson, Fauna Brit. India, Moths, i, p. 42 (1892).

193.

Gangarides citrina, sp. n. (Plate XXXI, fig. 3.)

♀. Head and thorax orange flecked with reddish; abdomen grey tinged with reddish. Forewings reddish orange, powdered with deeper red on the inner marginal area and suffused with fuscous on the costal area; antemedial line, which has three white dots on it, is irregularly waved, the lower portion is purplish; postmedial line inwardly oblique, reddish brown to vein 2, thence purplish to inner margin where it terminates near the antemedial; a white point at base of the wing, discal lunule dusky preceded by an orange triangular patch flecked with reddish. Hindwings buff, strongly tinged with reddish. Underside brownish buff; all the wings have a darker postmedial line, oblique on forewings and rather curved on hindwings.

Expanse 52 mm.

Female type from Nikko, August, 1893.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 122.

Family NOTODONTIDAE.

Genus Euhampsonia.

Dyar, Trans. Amer. Ent. Soc., xxiv, p. 14 (1897).

194.

Euhampsonia splendida.

Nadata splendida, Oberth., Étud. d'Ent., v, p. 63, pl. vi, fig. 3, p. 65; Staud., Rom. sur Lép., vi, p. 366.

Two male specimens taken at Tōbetsu, Oshima, Yezo, in July, 1903.

Hitherto unrecorded from Japan.

Local distribution. Yezo.

General distribution. E. Siberia (Askold, Amurland); Central China; Japan.

Collection number, 53*a*.

Genus Microphalera.

Butler, Cistula, Ent., iii, p. 119 (1885).

195.

Microphalera atrovittata.

Asteroscopus atrovittatus, Brem., Bull. Acad., Petersbg., ii, p. 483 (1861); Lep. Ost.—Sib., p. 46, pl. v, fig. 4 (1864).

Brachionycha atrovittata, Leech, Trans. Ent. Soc. Lond., 1898, p. 304; Kirby, Cat. Lep. Het., p. 562 (1892).

Microphalera atrovittatus, Staud., Cat. Lep. pal., i, p. 109, No. 813 (1901).

Destolmia insignis, Butl., Trans. Ent. Soc. Lond., 1881, p. 19; Leech, Trans. Ent. Soc. Lond., 1898, p. 311.

Notodonta toddii, Holland, Trans. Amer. Ent. Soc., xvi, p. 73 (1889); Leech, Trans. Ent. Soc. Lond., 1898, p. 311.

When in Pittsburgh, Pa., in 1900, I had an opportunity of examining Professor Holland's type of *toddii*, which is a female, and I recognised it as *atrovittata*, Brem. Since then I have sent Professor Holland a male specimen of *atrovittata* which, on comparison with his type, he pronounced to be the male of *toddii*. Staudinger in his catalogue includes *Destolmia insignis*, Butler, as a

synonym of *Microphalera atrovittatus* (= *Brachionycha atrovittata*). Leech records *atrovittata*, *insignis* and *toddii* from Japan, but treats them as distinct species.

Thirteen males and one female taken at Yoshino, Yamato; Nikko; Tōkyo; Tōbetsu and Junsai Numa, Yezo, in June, July and August, 1893 to 1895 and 1900 to 1902.

Local distribution. Hondo; Yezo; June to August.
General distribution. E. Siberia (Ussuri); Japan.
Collection number, 69.

Genus Ochrostigma.

Hübner, Verz., p. 146 (1827).

196.

Ochrostigma japonica, sp. n. (Plate XXX, fig. 25.)

♂. Head and collar blackish, thorax greyish mixed with blackish. Forewings pale grey suffused with fuscous and tinged with ochreous on the basal area, some ill-defined, black, subbasal marks, the discal mark indistinct; antemedial line black, double, slightly angled about the middle; postmedial line white, edged with blackish on each side; a blackish cloud enclosing two black marks on the costa before the apex; fringes of the ground-colour preceded by a blackish line. Hindwings fuscous with indistinct pale medial line. Underside fuscous with a pale transverse line on all the wings.

Expanse 34 mm.

♂. Type from Yoshino, Yamato, August, 1900.

A series of sixteen male specimens taken at Yoshino, Yamato, in June, July, August and September, 1899, 1901, also one specimen from Nikko, August, 1893. The series varies in expanse from 30 to 34 mm. I have never taken a female specimen. This species shows some variation in the fuscous suffusion of the forewings. The forewings of one specimen are almost uniformly fuscous, the ochreous basal patch is obsolete, the antemedial line is only faintly traceable, and the white postmedial line stands out in bold relief on the fuscous ground.

Allied to *O. melagona*, Bork., from Europe.

Local distribution. Hondo.
Habitat. Japan.
Collection number, 93.

Genus Fentonia.

Butler, Trans. Ent. Soc. Lond., 1881, p. 20; Hampson, Fauna Brit. India, Moths, i, p. 147 (1892).

197.

Fentonia sordida, sp. n. (Plate XXX, fig. 8.)

♂. Forewings brownish grey, faintly tinged with rosy, and clouded with fuscous on costal area towards apex; antemedial line black, outwardly oblique, with a bidentate projection on the costa, the basal area limited by this line is blackish; postmedial line blackish, double, dentate and deflected inwards below the middle; marginal line blackish, arcuate. Hindwings fuscous, fringes paler. Underside whitish brown, forewings suffused with fuscous.

Expanse of type 48 mm., of other specimens 44 mm.

Male type from Yoshino, Yamato, August, 1899.

Another male specimen from Yoshino, Yamato, June, 1901, and one male from Koya-San, Kishū, June, 1895.

Local distribution. Hondo.

Habitat. Japan.

Collection number, 78*a*.

198.

Fentonia nihonica, sp. n. (Plate XXX, fig. 5.)

♀. Head and thorax grey mixed with blackish; abdomen fuscous grey. Forewings grey dusted with blackish scales; subbasal line blackish, irregularly curved to the submedian nervule; antemedial line blackish, outwardly oblique, indented below the costa and above the inner margin, the space between these lines is clouded with blackish towards the costa; postmedial line blackish, wavy, dentate, dentations most pronounced at vein 5, and again above the inner margin, the line is outwardly bordered with blackish from the costa to vein 5, and there is a sagittate mark in a blackish cloud above the outer angle; marginal line blackish, arcuate; discal mark black, linear; fringes grey marked with blackish at ends of the nervules. Hindwings fuliginous with an obscure blackish discal dot; fringes preceded by a slightly sinuous blackish line. Underside fuliginous brown with slightly darker discal spots on all the wings and a faint postmedial line on the hindwings.

Expanse 55 mm.

Female type from Yoshino, Yamato, taken in August, 1900.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 78.

Genus STAUROPUS.

Germar, Prod., p. 45 (1811); Hampson, Fauna Brit. India, Moths, i, p. 149 (1892).

199.

Stauropus bidentatus, sp. n. (Plate XXX, fig. 9.)

♂. Head and thorax greyish white, collar and patagia edged with brownish; abdomen pale grey. Forewings greyish white with a large, bidentate, blackish patch occupying the upper portion of the basal half of the wing, the lower edge of the patch is traversed by a black longitudinal bar; a smaller blackish patch, enclosing two darker dashes, on the costa towards apex; three dentate, grey-edged whitish transverse lines, the antemedial only traceable below the larger patch; fringe white marked with blackish at ends of the nervules and preceded by a blackish, arcuate line. Hindwings fuscous grey, fringes white chequered with fuscous. Underside whitish, forewings tinged with deep fuscous, except on the inner margin; there are indications of a medial line on all the wings.

Expanse 35 mm.

Male type from Yoshino, Yamato, June, 1900.

A series of twenty male and four female specimens taken at Yoshino, Yamato, in May, June, July and August. 1895, 1899, 1900 and 1901. The series shows no variation in colour in either sex, and varies in expanse from 30 mm. in the male to 38 mm. in the female.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 92.

200.

Stauropus viridimixta.

Miselia viridimixta, Brem., Lep. Ost.—Sib., p. 52, pl. v, fig. 12 (1864).
Urodonta viridimixta, Staud., Rom. sur Lép., iii, p. 219 (1887).

Drymonia lichen, Oberth., Étud. d'Ent., v, p. 64, pl. viii, fig. 5 (1880).

Three male and two female specimens taken at Tōbetsu and Junsia Numa, Oshima, Yezo, in July and August, 1902.

Hitherto unrecorded from Japan.

Local distribution. Yezo.

General distribution. E. Siberia (Amurland, Ussuri); Japan.

Collection number, 68.

201.

Stauropus punctatella.

Orgyia punctatella, Motsch., Étud. Entom., 1860, p. 32.

Seven male specimens and one female taken in the following localities: Yoshino, Yamato, and Takao-San, Musashi, June and July, 1895, 1901, 1902; Tōbetsu and Junsai Numa, Oshima, Yezo, July, 1902.

Leech (Trans. Ent. Soc. Lond., 1899, p. 124) included this species as probably referable to *Dasychira pseudabietis*.

Two specimens in the National Collection, one from Nikko.

Hitherto unrecorded from Japan.

Local distribution. Hondo and Yezo.

Habitat. Japan.

Collection numbers, 77 and 77*a*.

202.

Stauropus perdix.

Dasychira perdix, Moore, Lep. Atk., p. 58, pl. iii, fig. 3 (1879).

Dasychira fasciatus, Moore, Lep. Atk., p. 58.

Stauropus comatus, Leech, Trans. Ent. Soc. Lond., 1898, p. 306.

Somera pryeri, Leech, Trans. Ent. Soc. Lond., 1889, p. 216.

In the Museum Collection both *pryeri*, Leech, and *comatus*, Leech, are included in the series labelled *perdix*, Moore, with *fasciatus*, Moore, as a synonym. The species would seem to be a most variable one, and the only character that remains constant in all the specimens is the submarginal line of forewings.

Recorded from Japan by Leech as *Somera pryeri*, and also from China as *Stauropus comatus*.

General distribution. INDIA; W. CHINA; JAPAN.

Genus GLUPHISIA.

Boisduval, Ind. Méth., p. 56 (1829).

203.

Gluphisia japonica, sp. n. (Plate XXX, fig. 12.)

♂. Forewings fuscous grey with white discal lunule; ante- and postmedial lines blackish, the first nearly straight, the second sinuous outwardly edged with pale greyish; indications of dark subbasal and antemarginal line. Hindwings and underside paler than the forewings, the latter with lines of upperside indicated.

Expanse 34 mm.

Male type from Hakodate, Yezo.

Two male specimens: one received from Mr. Andrews, Hakodate, Yezo; the other taken at Tōbetsu, Oshima, Yezo, in June, 1902.

Near *G. crenata*, Esp., of which it may be a local form.

Local distribution. YEZO.

Habitat. JAPAN.

Collection number, 193.

Genus NOTODONTA.

Ochsenheimer, Eur. Schmett., iii, p. 45 (1810); Hampson, Fauna Brit. India, Moths, i, p. 162 (1892).

204.

Notodonta tritophus.

Bombyx tritophus, Esp., Schmett., iii, p. 279, pl. lx, figs. 1, 2 (1786).

Bombyx torva, Hübn., Eur. Schmett., Bomb. (Text), p. 108 (1880).

A female specimen bred at Hakodate, Yezo, August 20, 1902. Compared with European examples this seems to be much greyer in colour.

Hitherto unrecorded from Japan.

Local distribution. YEZO.

General distribution. EUROPE; E. SIBERIA (Amurland, Ussuri); JAPAN.

Collection number, 35*a*.

205.

Notodonta monetaria.

Notodonta monetaria, Oberth. Diagn., p. 12; Étud. d'Ent., v, p. 62, pl. ii, fig. 6 (1880): Staud., Rom. sur Lép., vi, p. 354; Leech, Trans. Ent. Soc. Lond., 1898, p. 310.
Notodonta oberthüri, Staud., Rom. sur Lép., vi, p. 354, pl. v, fig. 5.

I have a series of six male and five female specimens of *N. monetaria* taken at Yoshino, Yamato, and Tōkyo in the months of May, June, July, August and September, 1893, 1894, 1899, 1900 and 1901. I also have two male specimens of *N. oberthüri* taken at Tōbetsu, Oshima, Yezo, in July, 1902. These two specimens agree remarkably well with Staudinger's figure (*supra*), and on comparing them with my series of *N. monetaria*, I am inclined to think that they are not separable from that species. *Oberthüri* seems to be a small light form of *monetaria* with which it can be connected by an intergrade in my series.

Oberthüri has not hitherto been recorded from Japan.

Local distribution. Hondo; Yezo.
General distribution. E. Siberia (Askold, Amurland, Ussuri); Japan.
Collection numbers, 88 and 88*a*.

206.

Notodonta gigantea.

Peridea gigantea, Butler, Ann. and Mag. Nat. Hist. (4), xx, pp. 474 (1877); Ill. Het. B. M., ii, pl. xxiv, fig. 6 (1878).
Notodonta gigantea, Kirby, Cat. Lep. Het., p. 600 (1892); Leech, Trans. Ent. Soc. Lond., 1898, p. 311.
Allodonta plebeja, Staud. (*nec* Oberthür), Rom. sur Lép., vi, p. 356 (1892).

Thirteen specimens from Yoshino, Yamato, June, July, August, 1899; Nikko, July, 1893; Tōbetsu and Shiokubi, Oshima, Yezo, July and August (1902).

Identified from Staudinger's figure.

There is no male of this species in the National Collection, only a female from Tōkyo. The male is similar

to the female; and has been recorded from Japan by Leech.

Local distribution. HONDO; YEZO.
Habitat. JAPAN.
Collection number, 89.

207.

Notodonta dembowskii.

Notodonta dembowskii, Oberth., Diagn., p. 11; Étud. d'Ent., v, p. 62, pl. ii, fig. 4 (1880).

A series of ten male and two female specimens taken at Junsai Numa and Tōbetsu, Oshima, Yezo, in May, June, July and August, 1902, 1903, and also at Nikko, in August, 1893. The specimens taken at Nikko are darker than Oberthür's type figure, whilst those taken in Yezo are darker than those from Nikko.

Hitherto unrecorded from Japan.

Local distribution. HONDO; YEZO.
General distribution. E. SIBERIA (Ussuri); JAPAN.
Collection number, 92*a*.

208.

Notodonta aliena.

Notodonta aliena, Staud., Rom. sur Lép, vi, p. 352, pl. v, fig. 4 (1892).

Two male specimens taken at Yoshino, Yamato, in June and September, 1895, 1899.

Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. E. SIBERIA (Ussuri); JAPAN.
Collection number, 94.

209.

Notodonta graeseri.

Notodonta graeseri, Staud., Rom. sur Lép., vi, p. 351, pl. v, fig. 3 (1892).

A male specimen taken at Yoshino, Yamato, September, 1899.

Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. E. SIBERIA (Ussuri); JAPAN.
Collection number, 94*a*.

210.

Notodonta lativitta, sp. n. (Plate XXX, fig. 4.)

♂. Head and thorax grey, collar and patagia edged with blackish, metathorax ornamented with ochreous and reddish brown; abdomen ochreous grey. Forewings grey clouded with whitish grey, a broad ferruginous stripe from the base of the wing to the submarginal line; subbasal and antemedial lines reddish brown, the first outwardly edged with paler, and obtusely angled at median nervure, appears to terminate on the submedian nervure; the antemedial is inwardly edged with paler, sharply angled below the costa and again before the inner margin; postmedial line dark, outwardly edged with whitish, wavy, towards the costa and the inner margin; submarginal line whitish, wavy, and dentate, with some brownish and fuscous marks on it; reniform whitish enclosing a brownish linear mark; fringes grey marked with paler and preceded by a blackish line. Hindwings whitish, ochreous along the abdominal margin, a grey cloud on the costa towards outer margin; fringes of the ground-colour with a dark line at their base. Underside whitish without any defined markings.

Expanse 58 mm.

Male type from Yoshino, Yamato, September, 1900.

Allied to *N. trepida*, Esp., but separable by the ferruginous stripe.

Local distribution. Hondo.

Habitat. Japan.

Collection number, 95.

211.

Notodonta basilinea, sp. n. (Plate XXX, fig. 23.)

♂. Head and thorax dark grey, edges of collar and patagia paler; abdomen, dark grey above, whitish below. Forewings dark grey tinged with ochreous brown; subbasal line blackish, wavy, indistinct, united to a black longitudinal streak from the base, outwardly edged with ochreous brown; antemedial line black, zigzag, inwardly edged with ochreous brown, indistinct towards the inner margin; postmedial line b'ack, dentate, outwardly edged with ochreous brown and followed by a subapical cloud of the same colour; reniform mark ochreous brown enclosing a short dark grey line; fringes pale grey mixed with darker and marked with blackish at the ends of the veins. Hindwings whitish tinged with buff and clouded with fuliginous along abdominal area; the outer marginal area is greyish,

darker in upper portion, traversed by a pale line which is bidentate about the middle; fringes of the ground-colour chequered with darker and preceded by a blackish line. Underside whitish tinged with buff; forewings have a dusky almost straight postmedial line, this is slightly angulated on the costa where it is preceded by a dusky cloud.

Expanse 52 mm.

Male type from Yoshino, Yamato, June, 1899.

A series of twenty-three male specimens from Yoshino, Yamato, taken in June and August, 1895, 1899, 1900, 1901. I have never captured a female specimen. Differs from *N. trepida*, its nearest ally, in the darker colour and denser scaling. Motschulsky records *N. trepida* from Japan, so that possibly the species now described may be identical with the one he identified as *trepida* (*vide* Leech "On the *Lepidoptera* of Japan and Corea," P.Z.S., 1881, p. 654). Specimens in the series expand from 48 to 54 mm.

Local distribution. Hondo.
Habitat. Japan.
Collection number, 91.

Genus Urodonta.

Staudinger, Rom. sur Lép., iii, p. 217 (1887).

212.

Urodonta branicki.

Uropus branicki, Oberth., Étud. d'Ent., v, p. 60, pl. vi, fig. 6 (1880); Staud., Rom. sur Lép., vi, p. 346 (1892).

One male and one female specimen taken *in copula* on a *Keyaki* tree at Tōkyo in April, 1894, and another female specimen taken at Junsai Numa, Oshima, Yezo, in July, 1902.

Hitherto unrecorded from Japan.

Local distribution. Hondo; Yezo.
General distribution. E. Siberia (Ussuri); Japan.
Collection number, 72.

213.

Urodonta arcuata.

Urodonta arcuata, Alph., Rom. sur Lép., ix, p. 154, pl. xi, fig. 9 (1897); Staud., Cat. Lep. pal., p. 107 (1901).

Recorded by Staudinger from Japan, unrecorded by Leech.

General distribution. E. SIBERIA (Amur, Ussuri); JAPAN.

Genus ODONTOSIA.

Hübner, Verz., p. 145 (1827).

214.

Odontosia cuculus.

Odontosia cuculus, Staudinger, Rom. sur Lép., iii, p. 226, pl. xvii, fig. 5 (1887).

One male specimen, Tōbetsu, province of Oshima, Yezo, vii, 9, 1902. Identified from Staudinger's figure.

This species resembles *Lophopteryx pryeri*, Butler, and possibly may be identical with it.

Hitherto unrecorded from Japan.

Local distribution. YEZO.

General distribution. E. SIBERIA (Sidemi, Amurland); JAPAN.

Collection number, 106.

Genus HYPERAESCHRA.

Butler, Ann. and Mag. Nat. Hist. (5), vi, p. 65 (1880); Hampson, Fauna Brit. India, Moths, i, p. 163 (1892).

215.

Hyperaeschra collaris.

Hyperaeschra collaris, Swinhoe, Ann. and Mag. Nat. Hist., xiv, p. 132 (1904).

A series of seven males and one female. Six males taken at Yoshino, Yamato, in May, June, July and September, 1895, 1899, 1900. One male taken at Junsai Numa, province of Oshima, and one female received from Mr. Andrews, Hakodate.

Hitherto unrecorded from Japan.

Local distribution. HONDO; YEZO.

General distribution. INDIA (Khasia Hills); JAPAN.

Collection number, 98.

216.

Hyperaeschra biloba.

Drymonia biloba, Oberth., Étud. d'Ent., v, p. 63, pl. viii, fig. 1 (1880).

Semidonta biloba, Staud., Rom. sur Lép., vi, p. 358 (1892); Staud., Cat. Lep. pal., i, p. 109 (1901).

Seven male specimens taken in the following localities: Tōbetsu and Junsai Numa, Oshima, Yezo, July, 1902; Nikko, July, 1893; Yoshino, Yamato, July, 1893, 1894.

Staudinger in his catalogue (*supra*) states that this species is similar to *Hyperaeschra basalis*, Moore, which is figured on p. 165 of Hampson's "Moths of British India," vol. i. The angulation of the postmedial line on the forewings differs in the two species, and *biloba* is smaller in expanse. My specimens of *biloba* measure 40 mm. to 44 mm., whilst *basalis* measures 50 mm. in expanse.

Hitherto unrecorded from Japan.

Local distribution. Yezo; Hondo.
General distribution. E. Siberia (Ussuri); Japan.
Collection number, 64.

Genus Lophopteryx.

Stephens, Ill. Brit. Ent., Haust., ii, p. 26 (1829); Hampson, Fauna Brit. India, Moths, i, p. 166 (1892).

217.

Lophopteryx saturata.

Lophopteryx saturata, Walk., Cat. Lep. Het., xxxii, p. 411 (1865); Butl., Ill. Typ. Lep. Het., vi, pl. cvii, fig. 1 (1886); Hampson, Fauna Brit. India, Moths, i, p. 166 (1892).

Lophopteryx saturata, var. *hoegei*, Graeser, Berl. ent. Zeit., 1888, p. 143.

A male specimen of the typical form taken at Karuizawa, Shinano, in July, 1900. Four males and seven females of var. *hoegei*, Graeser, taken at the following localities: Junsai Numa, Tōbetsu and Hakodate, province of Oshima, Yezo, and Sapporo, province of Ishikari, Yezo, in July and August, 1896, 1902, 1903. I also bred the imago of *hoegei* in September, 1902, at Hakodate.

Hitherto unrecorded from Japan.

Local distribution. YEZO.
General distribution. SIKHIM; E. SIBERIA (Ussuri); JAPAN.
Collection numbers, 101 (*saturata*), 102 (*hoegei*).

218.

Lophopteryx admirabilis.

Lophopteryx admirabilis, Staud., Rom. sur Lép., iii, p. 224, pl. xii, fig. 9 (1887).

Five male and one female specimens taken at Nikko in August, 1893, and at Tōbetsu, Oshima, Yezo, in August, 1903.
Hitherto unrecorded from Japan.
Local distribution. HONDO; YEZO.
General distribution. E. SIBERIA (Ussuri); JAPAN.
Collection number, 105.

219.

Lophopteryx velutina.

Drymonia velutina, Oberth., Étud. d'Ent., v, p. 64, pl. viii, fig. 2 (1880).

Two male specimens; one received from Mr. Andrews, Hakodate, and the other taken at Tōbetsu, Oshima, Yezo, in June, 1903.
Hitherto unrecorded from Japan.
Local distribution. YEZO.
General distribution. E. SIBERIA (Ussuri, Amurland); JAPAN.
Collection number, 120.

Genus HIMEROPTERYX.

Staudinger, Rom. sur Lép., iii, p. 228 (1887).

220.

Himeropteryx miraculosa.

Himeropteryx miraculosa, Staud., Rom. sur Lép., iii, p. 228, pl. xii, fig. 10.

One male specimen taken at Junsai Numa, Oshima, Yezo, in October, 1901.
Hitherto unrecorded from Japan.
Local distribution. YEZO.
General distribution. E. SIBERIA (Amurland); JAPAN.
Collection number, 121.

Genus SPATALIA.

Hübner, Verz., p. 145 (1827); Hampson, Fauna Brit. India, Moths, i, p. 168 (1892).

221.

Spatalia dives.

Spatalia dives, Oberth., Étud. d'Ent., x, p. 15, pl. i, fig. 1 (1884).

Two male specimens taken in July, 1902, at Junsai Numa, Oshima, Yezo.

Hitherto unrecorded from Japan.

Local distribution. YEZO.

General distribution. E. SIBERIA (Ussuri); JAPAN.

Collection number, 109.

222.

Spatalia doerriesi.

Spatalia doerriesi, Graeser, Berl. ent. Zeit., 1888, p. 141.
Spatalia plusiotis, Staud., Rom. sur Lép., vi, p. 359 (part).

Two male specimens and one female from Tōbetsu, Oshima, Yezo, July, 1902 and 1903.

Hitherto unrecorded from Japan.

Local distribution. YEZO.

General distribution. E. SIBERIA (Ussuri); JAPAN.

Collection number, 110.

Genus ICHTHYURA.

Hübner, Verz., p. 162 (1827); Hampson, Fauna Brit. India, Moths, i, p. 172 (1892).

223.

Ichthyura troglodyta.

Pygaera troglodyta, Graeser, Berl. ent. Zeit., 1890, p. 22; Staud., Rom. sur Lép., vi, pl. v, fig. 7 (1892).

A male and female from Yoshino, Yamato, taken in June, 1899 and 1901.

Hitherto unrecorded from Japan.

Local distribution. HONDO.

General distribution. E. SIBERIA (Ussuri); COREA JAPAN.

Collection number, 186.

224.

Ichthyura sieversi.

Pygaera sieversi, Staud., Rom. sur Lép., vi, p. 370, pl. v, fig. 6, *a*, *b*.

A series of five male and four female specimens taken at Yoshino, Yamato, in June and July, 1895, 1900 and 1901.

The females of this species agree well with the figure of female type which appears in Staudinger's plate above referred to. The males, however, are considerably worn, but seem also referable to *sieversi* and not to *troglodyta*, Graeser.

Hitherto unrecorded from Japan.

Local distribution. Hondo.
General distribution. E. Siberia (Ussuri); Japan.
Collection number, 186*a*.

Family GEOMETRIDAE.

Sub-family *BOARMIANAE.*

Genus Bapta.

Stephens, Ill. Brit. Ent., Haust., iii, p. 294 (1829); Hampson, Fauna Brit. India, Moths, iii, p. 154 (1895).

225.

Bapta deletaria.

Bapta deletaria, Moore, Lep. Atk., p. 261, pl. viii, fig. 14; Hampson, Fauna Brit. India, Moths, iii, p. 155 (1895).
Macaria indistincta, Moore, Lep. Atk., p. 261.

Two male and one female specimens taken at Yoshino, Yamato, in August and September, 1899, 1900. These are referable to *indistincta*, Moore.

Expanse 32 mm. to 38 mm.

Hitherto unrecorded from Japan.

Local distribution. Hondo.
General distribution. Khásis; Japan.
Collection number, 444.

Genus Dilinia.

Hübner, Verz., p. 310 (1827); Hampson, Fauna Brit. India, Moths, iii, p. 216 (1895).

226.

Dilinia punctata.

Deilinia (?) *punctata*, Warr., Nov. Zool., i, p. 405 (1894); Swinhoe, Trans. Ent. Soc. Lond., 1902, p. 603.
Bapta candidaria, Leech, Ann. and Mag. Nat. Hist. (6), xix, p. 198 (1897).

Type ♀, Japan, in collection Rothschild, Tring.
Type (*candidaria*) Oiwake, Japan, in B. M.
Recorded by Leech from Japan as *Bapta candidaria*.

Habitat. Japan.

Genus Syntaracta.

Warren, Nov. Zool., i, p. 408 (1894).

227.

Syntaracta hadassa.

ab. *unicolor*, ab. nov. (Plate XXXI, fig. 26.)

Anisodes hadassa, Butl., Ann. and Mag. Nat. Hist. (5), i, p. 400 (1878); Ill. Het. B. M., iii, p. 38, pl. l, fig. 5 (1879).
Syncgia inconspicua, Butl., Trans. Ent. Soc. Lond., 1881, p. 412.
Syntaracta hadassa, Warr., Nov. Zool., i, p. 408 (1894).

In a pale brown unicolorous form of *Syntaracta hadassa*, Butl., which I have named ab. *unicolor*, the black discal dots are very small and the transverse wavy lines are absent.
Male type from Kōbe, July, 1901.

Local distribution. Hondo (*unicolor*).
General distribution. C. China; Japan (*hadassa* and *inconspicua*).
Collection number, 399*b*.

Genus Corymica.

Walker, Cat. Lep. Het., xx, p. 230 (1860); Hampson, Fauna Brit. India, Moths, iii, p. 185 (1895).

228.

Corymica caustolomaria.

Corymica caustolomaria, Moore, Lep. Atk., p. 231 (1888).
Corymica gensanaria, Leech, Entom., Suppl., p. 56 (1896); *id.*, Ann. and Mag. Nat. Hist. (6), xix, p. 299 (1897).

Three male and three female specimens taken at Kiire and Kagoshima, province of Satsuma, in July and August, 1895, and at Hakusan-dake, province of Ōsumi, September, 1895; one specimen unlocalised.

Hitherto unrecorded from Japan.

Gensanaria, Leech, is placed with *caustolomaria* in the National Collection.

Local distribution. Kyūshū.
General distribution. India; Corea; Japan.
Collection number, 430.

Genus Crypsicometa.

Warren, Nov. Zool., i, p. 463 (1894).

229.

Crypsicometa incertaria.

ab. *plana*, ab. nov.

Phasiane incertaria, Leech, Entom., Suppl., p. 49 (May, 1891).
Phasiane incertaria, var. *suffusa*, Leech, *l. c.*
Crypsicometa incertaria, Warren, Nov. Zool., i, *l. c.*; Leech, Ann. and Mag. Nat. Hist. (6), xix, p. 302 (1897).

Ab. *plana*. Uniform pale ochreous brown, slightly pink tinged; a black discal dot on each wing, other marking absent.

Male type unlocalised, Japan only.

Three female specimens taken at Hiyeizan, near Kyōtō province of Yamashiro; Hiko-San, Buzen; Yoshino, Yamato; May, June, October, 1893, 1899, 1901.

Local distribution. Hondo; Kyūshū (*Wileman*).
General distribution. W. China; Japan.
Collection number, 434.

Genus Bupalus.

Leach, Zool. Miscell., i, 79 (1814).

230.

Bupalus vestalis.

Bupalus vestalis, Staud., Iris, x, p. 63, pl. ii, fig. 41 (1897); Cat. Lep. pal., i, p. 351 (1901).

Four males received from Mr. Andrews taken at Hakodate, Yezo, and one male obtained by my Japanese collector in same locality in May, 1902.

Hitherto unrecorded from Japan.

Local distribution. Yezo.
General distribution. Amurland; Japan.
Collection number, 490.

Genus Garaeus.

Moore, Proc. Zool. Soc. Lond., 1867, p. 623; Hampson, Fauna Brit. India, Moths, iii, p. 233 (1895).

231.

Garaeus specularis.

Garaeus specularis, Moore, Proc. Zool. Soc. Lond., 1867, p. 623, pl. xxxii, fig. 3; Hampson, Fauna Brit. India, Moths, iii, p. 233 (1895); Leech, Ann. and Mag. Nat. Hist. (6), xix, p. 214 (1897).

One male specimen, which is more uniformly brown in colour than any specimen in the series from India, China, and Japan, in the National Collection. Taken at Kōse, near Karuizawa, Shinano, August, 1899.

Local distribution. Hondo.
General distribution. Sikhim; Central China; Japan.
Collection number, 410.

Genus Ourapteryx.

Leach, Zool. Miscell, i, p. 79 (1814); Hampson, Fauna Brit. India, Moths, iii, p. 144 (1895).

232.

Ourapteryx cretea.

Ourapteryx cretea, Swinh., Trans. Ent. Soc. Lond., 1902, p. 601.

Described by Swinhoe from Japan.

Seven male and two female specimens taken in the following localities: Owajima, Iyo, May, 1893; Kumamoto, and Haki, Higo, June and July, 1894; Yoshino and Narai, Yamato, June, 1899, 1901; Ikeda, near Kōbe, May and June, 1899.

Type in B. M. from Ōjigoku (near Miyanoshita), Hondo.

Local distribution. SHIKOKU; KYŪSHŪ; HONDO.
Habitat. JAPAN.
Collection number, 372.

Genus TRISTROPHIS.

Butler, Journ. Linn. Soc. Zool., vii, p. 199 (1883).

233.

Tristrophis veneris.

Urapteryx veneris, Butl., Ann. and Mag. Nat. Hist. (5), i, p. 392 (1878); Ill. Het. B. M., iii, p. 29, pl. xlviii, fig. 1 (1879).

Tristrophis veneris, Leech, Ann. and Mag. Nat. Hist. (6), xix, p. 195 (1897); ab. *unistriga*, Warr., Nov. Zool., x, p. 268 (1903).

Warren, referring to ab. *unistriga*, remarks: "In this aberration the first and second crossbands of the forewings are wanting, the second entirely, the first indicated by a slight dot on costa and another on median vein. Underside the same. The markings of the hindwings are normal."

Type ♀ in Tring Museum.

A series of three males and six females, typical form, taken at Tōkyo, Bukenji, near Kanagawa (Yokohama), in June, 1894.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 376.

Genus GONODONTIS.

Hübner, Verz., p. 287 (1827).

234.

Gonodontis bidentata.

Geometra bidentata, Clerck, Icon., vii, 2 (1759–64).
Gonodontis bidentata, Staud., Cat. Lep. pal., i, p. 328 (1901).

Staudinger records this species from Japan, unrecorded by Leech.

General distribution. EUROPE; ALTAI MOUNTAINS; TARBAGATAI; MONGOLIA; EAST SIBERIA (Amurland, Ussuri); JAPAN.

Genus HYGROCHROA.

Hübner, Verz., p. 293 (1827).

235.

Hygrochroa parva.

Pericallia parva, Hedem., Horae. Ent. Ross., xvi, p. 45 (1881).
Pericallia syringaria, var. *parva*. Staud., Iris, x, p. 31 (1897); Cat. Lep. pal., i, p. 328 (1901).
Hygrochroa distans, Warr., Nov. Zool., ii, p. 143 (1895).
Pericallia distans, Leech, Ann. and Mag. Nat. Hist. (6), xix, p. 207 (1897).

I bred twenty-one male and female specimens of *H. parva* in July, 1902, from larvae taken at Hakodate at the end of June and commencement of July on *Ibota* (*Ligustrum ibota*, Sieb.), a species of privet, and consider that *parva* is a good species quite distinct from *H. syringaria*, L. Staudinger's catalogue treats this species as a variety of *syringaria*. The larvae of *parva* appear at the end of June and commencement of July, whilst those of *syringaria*, which I have also bred, appear in Hakodate at the commencement of June. The larvae of the two species are also quite different. *Parva* has paired dorsal warts on the sixth, seventh, eighth and ninth segments and lacks the paired, long curved hooks on the eighth segment which is the distinguishing feature of *syringaria* larva. Moreover the colour of *parva* and *syringaria* larvae is different, but the absence of the long curved hooks in *parva* is of course the most important character. My specimens of *parva* emerged from the pupa between July 18 and 28,

whilst *syringaria* emerged from June 27 to July 26. I have also a male specimen of *parva* taken at Hakusan-dake, Ōsumi, in September, 1895.

Warren records *distans* (= *parva*) from Japan.

Local distribution. Yezo; Kyūshū.
General distribution. E. Siberia (Amurland, Ussuri); Japan.
Collection number, 403.

236.

Hygrochroa syringaria.

Phal.-Geometra syringaria, Linn., Syst. Nat., x, 520.
Hygrochroa syringaria, Staud., Cat. Lep. pal., i, p. 328 (1901).

Two male and three female specimens all bred from larvae taken at Junsai Numa, near Hakodate, in June, 1902, found feeding on *Shiro-utsugi* (*Stephanandra flexuosa*, S. and L.). The imagines emerged in June and July. Leech does not record *syringaria* from Japan, but it is mentioned by Staudinger.

Local distribution. Yezo.
General distribution. Europe; Armenia; W. Siberia; E. Siberia (Amurland, Ussuri); Japan.
Collection number, 403*a*.

237.

Hygrochroa (?) *discolor.*

Garaeus discolor, Warren, Proc. Zool. Soc. Lond., 1893, p. 400, pl. xxxii, fig. 19; Hampson, Fauna Brit. India, Moths, iii, p. 234 (1895).

One male specimen from Kiire, province of Satsuma, Kyūshū, July 29, 1895.

There are three specimens of this species in the National Collection, South Kensington: one from the Khásis, one from Ichang, and one from Kyūshū, Japan (Leech).

Hitherto unrecorded from Japan.

Local distribution. Kyūshū.
General distribution. India; China; Japan.
Collection number, 402.

Genus Sebastosema.

Warren, Nov. Zool., iii, p. 100 (1896).

238.

Sebastosema (?) *tripartita*, sp. n. (Plate XXXI, fig. 5.)

♀. Head and thorax brown; abdomen greyish brown, edges of the segments furnished with blackish spines, on segments 6 and 7 there are double rows of spines and these are fringed with brownish hair. Forewings brown on basal and outer marginal areas, whitish brown on medial area; antemedial line black, oblique, limiting the outer marginal area; submarginal line indicated by some blackish dots towards the costa. Hindwings pale brown, darker on the outer marginal area; discal dot black. Fringes brown. Under surface similar to above but the brown colour of the forewings is paler, especially on the basal area.

Expanse 44 mm.

Female type from Sendagaya, Tōkyo, November, 1894.

Local distribution. Hondo.
Habitat. Japan.
Collection number, 923.

Genus Epione.

Duponchel, Cat. Lép. Eur., vii (2), p. 211 (1829).

239.

Epione magnaria, sp. n. (Plate XXXI, fig. 29.)

♀. Pale ochreous sparingly powdered with brownish. Forewings have a linear blackish discal dot; antemedial and postmedial lines brown, the first curved towards the costa and the latter almost parallel with the outer margin but slightly bent outwards before the costa. Hindwings have a curved brown line that appears to be a continuation of the postmedial on forewings. Underside paler, all the wings have a brown postmedial line and there are faint traces of the discal mark and of the antemedial line on forewings.

Expanse 36 mm.

Female type from Nikko, October, 1893.

Local distribution. Hondo.
Habitat. Japan.
Collection number, 539.

Genus Proteostrenia.

Warren, Nov. Zool., ii, p. 153 (1895).

240.

Proteostrenia pica, sp. n. (Plate XXX, fig. 18.)

♀. Forewings have the basal two-thirds blackish with two whitish spots at the base and two about the middle of the costa; outer third whitish, the neuration blackish; submarginal line blackish, connected with the basal two-thirds by a blackish dash between veins 3 and 4. Hindwings have the basal half blackish with a white spot in the cell; outer half white, traversed by two blackish curved bands, venation blackish. Fringes blackish marked with white on the forewings. Underside as above.

Expanse 28 mm.

Female type taken at Ōmine-San, Yamato, July, 1894. This may possibly prove to be the female of the following species *P. atrata*.

Local distribution. Hondo.
Habitat. Japan.
Collection number, 440.

241.

Proteostrenia atrata, sp. n. (Plate XXXI, fig. 24).

♂. Sooty black. Forewings have a white spot at apex and a short white dash on the costa, one-fourth from the apex; there are traces of a pale postmedial line from the white dash extending to the inner margin and bent inwards below the cell; discal dot black. Fringes slightly paler. Underside as above.

Expanse 32 mm.

Male type from Iida-San, Higo, May, 1894. A series of eleven male specimens taken in May, July, and August, 1894, at Ōmine-San and Ōbamine-San, in the province of Yamato, and at Iida-San, Higo. Nine of the specimens were taken on July 21 and 22, 1894, at Ōmine-San, the remaining two at Ōbamine-San and Iida-San in May and August, 1894. I am inclined to think that the preceding insect already described by me as *Proteostrenia pica* will prove to be the female of *Proteostrenia atrata*. The female type of *P. pica* was taken at Ōmine-San, where the majority of the males of *P. atrata* were captured, and it is the only specimen I possess. A similar

striking difference in the sexes exists in the case of *P. leda*, Butl., the female of which was named *Epione strenioides* by Butler, and was eventually discovered to be the female of *leda*.

The series does not show any variation in colour or markings, and the specimens measure in expanse from 28 mm. to 32 mm.

Local distribution. Hondo; Kyūshū.
Habitat. Japan.
Collection number, 514.

242.

Proteostrenia leda.

Epione leda, Butl., Ill., Het. B. M., ii, p. 46, pl. xxxv, fig. 5 1878 (♂).
Epione strenioides, Butl., *l. c.*, fig. 6 (♀).
Epione lachrymosa, Butl., Trans. Ent. Soc., 1881, p. 402, var. (♂).
Epione ossea, Butl., *l. c.* (var. ♀).
Calcaritis oberthüerii, Butl., *op. cit.*, p. 597 (var. ♀).
Therapis straminea, Butl., *op. cit.*, p. 401 (var. ♀).
Proteostrenia leda, ab. *occulta*, Warr., Nov. Zool., viii, p. 200 (1901).
Ephoria leda, Leech, Ann. and Mag. Nat. Hist. (6), xix, p. 202 (1897).
Proteostrenia occulta, Swinh., Trans. Ent. Soc. Lond., 1902, p. 628.

Ab. *occulta* was described by Warren from Kariyama, Japan; unrecorded by Leech. Male type in Tring Museum.

General distribution. Central and W. China; Japan.

Genus Amblychia.

Guenée, Uranides et Phalénites, i, p. 214 (1857); Hampson, Fauna Brit. India, Moths, iii, p. 241 (1895).

243.

Amblychia angeronaria.

Amblychia angeronaria, Guen. Phal., i, p. 215, pl. iv, fig. 9 (1857); Hampson, Fauna Brit. India, Moths, iii., pp. 241, 242, fig. 129 (1895).

One male and two female specimens from Hiko-San, Buzen, May and June, 1893. The whitish lunules of the

inner edge of the antemedial dark line are entirely absent in one female and faintly present in the other.

Hitherto unrecorded from Japan.

Local distribution. Kyūshū.

General distribution. Sikhim; Assam; Ceylon; Andamans; Sumatra; Java; Japan.

Collection number, 477.

Genus Duliophyle.

Warren, Nov. Zool., i, p. 432 (1894).

244.

Duliophyle agitata.

Boarmia agitata, Butl., Ann. and Mag. Nat. Hist. (5), i, p. 396 (1878); Ill. Het. B. M., iii, p. 33, pl. xlviii, fig. 9 (1879).

Xandrames agitata, Leech, Ann. and Mag. Nat. Hist. (6), xix, p. 327 (1897).

Duliophyle agitata, Warr., Nov. Zool., i, p. 432 (1894).

Duliophyle agitata, ab. *diluta*, Warr., Nov. Zool., vii, p. 113 (1900).

Warren describes an aberration of *D. agitata*, ab. *diluta*, which was not mentioned by Leech in his catalogue. Warren remarks: "One male marked simply Japan; it is therefore not known whether the insect represents an accidental paler and larger form, or a local difference."

Type ♂ in Tring Museum.

A series of five males and one female taken at Karuizawa, Shinano, August, 1900; Yezo (*Andrews*); Koya-San, Kii, September, 1894. The specimen from Yezo, a male, is paler than the others and not so heavily marked with fuscous. It is probably near the aberration *diluta* described by Warren, but is much smaller, only 54 mm., whilst *diluta* is 72 mm.

Local distribution. Hondo; Yezo.

Habitat. Japan.

Collection number, 488.

Genus Lycia.

Hübner, Verz., p. 319 (1827).

245.

Lycia betularia.

Geometra betularia, Linn., Syst. Nat., x, p. 521 (1758); Staud., Cat. Lep. pal., p. 336 (1901).
Amphidasis doubledayaria (ab.), Millére, Icones, ii, p. 228, pl. lxxv, fig. 7 (1864), and iii, p. 117, pl. iii, fig. 1 (1869).
Amphydasis cognataria (v. *et* ab. ?), Guen., i, p. 208 (1857); Pack., Geom., 413.
Biston betularia, ab. *nigra*, Heyl., Tijdschr., xiii, p. 155, pl. vi, fig. 3 (1870).
Biston betularius, var. *fumosarius*, Alph., Rom. sur Lép., ix, p. 140 (1897).
Biston robustum, var. *parva*, Leech, Ann. and Mag. Nat. Hist. (6), xix, p. 323 (1897).
Eubyjodonta concinna (v. *et* ab. ?), Warr., Nov. Zool., vi, p. 50 (1899).

Betularia has not been recorded from Japan by Leech, but is recorded by Staudinger. Leech, however, describes *Biston robustum*, var. *parva*, from China, which in the National Collection is placed in the series of *cognataria*, Guen. *Cognataria* from North America is considered by Staudinger to be a form of *betularia*.

One male specimen of var. *parva* from Junsai Numa, province of Oshima, Yezo, July, 1902. Leech's ♂ type is from Pu-tsu-fong, W. China.

Local distribution. Yezo; Hondo, Oiwake (*Pryer*).

General distribution. Europe; N. America (*cognataria*); Armenia; W. Turkestan; W. and E. Siberia; Central and W. China; Japan.

Collection number, 474.

246.

Lycia robustum.

Biston robustum, Butler, Ann. and Mag. Nat. Hist. (5), iv, p. 371 (1879); Leech, Ann. and Mag. Nat. Hist. (6), xix, p. 322 (1897).
Eubyja robustum, ab. *albicollis*, Warr., Nov. Zool., viii, p. 199 (1901).

A series of fifteen males and two females, the specimens measuring in expanse from 50 mm. ♂ to 72 mm. ♀, all taken in the neighbourhood of Tōkyo from March 19

to April 11, during a period of five years. Among the series are specimens of ab. *albicollis* taken during the same period. *B. robustum* is always found at rest on the trunks of various species of dwarf oaks (Ō-nara = *Quercus crispula*, Bl.; Ko-nara = *Quercus glandulifera* Bl., and Kunugi = *Quercus serrata*, Thnbg.), on which the larva feeds. It is one of the earliest moths to appear, and I have rarely seen it later than the middle of April. It is difficult to find, as its wings as a rule harmonise so perfectly with its resting-place on the bark of the oak trees. Warren remarks concerning ab. *albicollis*, which is unrecorded by Leech: "Butler's types, ♂ and ♀, have both the wings and head of the same dully grey-brown tint; in a ♂ from Yokohama, while the central area of both wings and apical area of forewings are whitish in ground-colour thickly speckled like the rest of the wings with dark, the upper half of face and the whole breadth of the shoulders are clear white. The third example in the British Museum Collection, also a ♂ from Yokohama, agrees with the present specimen in these respects; whether this paler form is peculiar to the Yokohama district or not remains to be proved."

Type of ab. *albicollis*, ♂ in B. M.

Local distribution. HONDO (Yokohama, Tōkyo).
Habitat. JAPAN.
Collection number, 476.

247.

Lycia tortuosa, sp. n. (Plates XXX, fig. 1, ♂; XXXI, fig. 27, ♀.)

♂. Antennae bipectinate. Forewings dark grey suffused with blackish especially on the basal two-thirds; antemedial line black, curved, indented at costa and about middle; postmedial line black with a deep sinus before the middle and a lesser one under vein 2; there is a dusky transverse shade between the ante- and postmedial lines but nearer to the latter; submarginal line whitish, indistinct. Hindwings rather paler on basal three-fourths, transverse lines appear to be continuations of those on the forewings, and there is a black dot on the medial one. Underside pale greyish suffused and clouded with fuscous; forewings have a blackish discal mark and three transverse lines, the outer one which is most distinct, black, almost erect, but slightly bent opposite end of the cell; hindwings have a black discal spot preceded by a dusky transverse

shade and followed by a black transverse line which is bent opposite the spot.

Expanse 42 mm.

♀. Browner, the antemedial line of forewings not so distinctly dentate below the costa, and the upper sinus of postmedial line not so deep as in the male.

Male type from Tōbetsu, Oshima, July, 1902. Female type from Nikko, August, 1893. A series of eight male specimens and one female taken at Tōbetsu and Junsai Numa, Oshima, Yezo, in June and July, 1902, 1903, and at Nikko, August, 1893.

Expanse of series from 34 to 42 mm.

Local distribution. Yezo; Hondo.

Habitat. Japan.

This species comes near *Lycia* (*Biston*) *robustum*, var. *parva*, Leech. It differs, however, from *parva* in the antemedial line being indented below costa, and in its much smaller size.

Collection numbers, 533, 533*a*.

Genus Gnophos.

Treitschke, Eur. Schmett., vi, i, p. 160 (1827); Hampson, Fauna Brit. India, Moths, iii, p. 251 (1895).

248.

Gnophos perdita.

Gnophos perdita (Butler ?), Staud., Iris, x, p. 61 (1897), Cat. Lep. pal., i, p. 345 (1901).

Staudinger records this species from Japan with a query, and states in the Iris (*supra*) that a female of this species was identified for him by Leech, but that he is unable to discover where Butler described the species; unrecorded by Leech.

General distribution. E. Siberia (Ussuri); ? Japan.

Genus Alcis.

Curtis, Brit. Ent., p. 113 (1829).

249.

Alcis invenustaria.

Amphidasys invenustaria, Leech, Entom., suppl., p. 43 (May, 1891).

Biston invenustaria, var. *sinicaria*, Leech, Ann. and Mag. Nat. Hist. (6), xix, p. 324 (1897).
Alcis invenustaria, ab. *suffusaria*, Warr., Nov. Zool., viii, p. 32 (1901).
Alcis molata, Warren, Nov. Zool., viii, p. 33 (1901).
Boarmia invenustaria, Swinhoe, Trans. Ent. Soc. Lond., 1902, p. 624.

Warren has described an aberration, *suffusaria*, which is not mentioned by Leech in his catalogue. Warren's form, *suffusaria*, is exactly the opposite of Leech's form, *sinicaria*. In the latter the black markings and brown bands are darker and more prominent. In the former all black markings are absent, and the upper surface of both wings is suffused with dull grey in which even the brown markings are almost lost.

A series of eight males and two females of the typical form taken at Yoshino, Yamato, in June, July, August, 1899, and at Junsai Numa, Oshima, Yezo, June, 1902: var. *sinicaria*, Leech, type ♂, from W. China (Moupin); ab. *suffusaria*, Warr., type ♂, from Japan (Yokohama).

Local distribution. Hondo; Yezo.
General distribution. Central and Western China; Japan.
Collection number, 481.

Genus Boarmia.

Treitschke, Eur. Schmett., v, p. 433 (1825); Hampson, Fauna Brit. India, Moths, iii, p. 256 (1895).

250.

Boarmia concinnata, sp. n.

♂. Antennae bipectinate, the branches slender and decumbent. Forewings whitish grey, powdered with greyish brown most densely on the outer marginal area; antemedial line blackish, curved, indistinct; postmedial line black, outwardly edged with whitish, curved inwardly to lower angle of cell, thence oblique to the inner margin; medial line outwardly oblique to lower angle of cell, thence parallel with postmedial line to the inner margin; submarginal line whitish, sinuous; some black dots on the outer margin between the nervules. Hindwings whitish, sparingly powdered with greyish brown, more heavily on the outer marginal area; there are traces of a blackish medial line on the abdominal area, the postmedial line is black and

wavy, and the submarginal is whitish, wavy, indistinct. Fringes of all the wings whitish grey preceded by a wavy black line. Underside whitish, powdered with fuscous brown; all the wings have a blackish discal dot and traces of a blackish postmedial line on the costa.

Expanse 40 mm.

A series of three male specimens taken at Hakodate, April, 1902, measuring in expanse from 37 to 40 mm.

Agrees very closely in markings with *B. interrupta*, and possibly may be a pale form of that species.

Local distribution. YEZO.
Habitat. JAPAN.
Collection number, 526.

251.

Boarmia interrupta, sp. n. (Plate XXX, fig. 2.)

♂. Antennae bipectinate, the branches slender and decumbent. Forewings brownish, upper part of median third whitish brown as also is the space between the antemedial and medial lines; antemedial line black, curved through the cell thence slightly oblique to the inner margin, a black dot on it at costa and at median nervure; postmedial line black, outwardly edged with whitish-brown, undulated; medial line outwardly oblique from costa to middle of the cell where it is bent inward to lower angle of the cell thence almost parallel with postmedial to the inner margin; submarginal line whitish, wavy, outwardly edged with deep brown. Hindwings whitish brown powdered with darker; antemedial line brown, not well defined especially towards the costa; postmedial line blackish, serrate, followed by a brown shade; submarginal band whitish, wavy, indistinct towards the costa. Fringes of all the wings greyish brown, preceded by a black wavy line, the line on forewings with black dots on it. Underside whitish, suffused with fuscous on forewings and powdered with fuscous on the hindwings; all the wings have a blackish discal dot and a dusky transverse line beyond, but that on the forewings is only traceable on the costal area.

Expanse 36 mm.

Male type from Tōkyo, April, 1893.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 526*a*.

252.

Boarmia pagina, sp. n. (Plate XXXI, fig. 28.)

♀. Head and thorax pale grey mixed with darker, the collar tipped with black, abdomen darker grey. Forewings whitish, powdered with brownish grey; antemedial line black, curved, slightly dentate; postmedial line black, outwardly edged with whitish, sinuous, dentate below the middle; a dusky discal spot with a blackish excurved medial line beyond it; submarginal line whitish, indistinct below the costal area. Hindwings agree in colour with the forewings, medial and postmedial lines black, the latter dentate, both well defined except towards the costa. Fringes grey preceded by a fine blackish line, with black dots on it, between the veins. Underside silky greyish white, the markings of the upperside faintly reproduced.

Expanse 43 mm.

Female type from Hakodate, April, 1902.

Local distribution. YEZO.

Habitat. JAPAN.

Collection number, 534.

253.

Boarmia amphidasyaria.

Boarmia amphidasyaria, Oberth., Étud. d'Ent., v, p. 46, pl. ix, fig. 6 (1880); Staud., Iris, x, p. 48 (1897); Cat. Lep. pal., i, p. 338, No. 3851 (1901).

A female specimen from Hakodate, taken in April, 1902. Differs from the figure of the type in having the transverse lines more distinct, and the submarginal line is preceded by a whitish band which is contracted about the middle.

Staudinger records this species from Japan, unrecorded by Leech.

Local distribution. YEZO.

General distribution. USSURI; JAPAN.

Collection number, 593.

254.

Boarmia dissimilis.

Boarmia dissimilis, Staud., Iris, i, p. 52, pl. ii, fig. 36.

Two female specimens taken at Yoshino, Yamato, in June, 1900, 1901.

Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. E. SIBERIA (Ussuri); JAPAN.
Collection number, 531.

255.

Boarmia definita.

Boarmia definita, Butl., Trans. Ent. Soc. Lond., 1881, p. 407; Leech, Ann. and Mag. Nat. Hist. (6), xix, p. 417 (1897).
Alcis nigrifumata, Warr., Nov. Zool., viii, p. 199 (1901).

Type *nigrifumata*, ♂, in Tring Museum, June, 1896. Recorded by Leech from Japan as *Boarmia definita*.

Local distribution. HONDO, Oiwake (*Pryer*); Tōkyo, type (*Fenton*); Oyama (*nigrifumata*), (*Fenton*).
Habitat. JAPAN.

256.

Boarmia lectonia.

Boarmia lectonia, Swinh., Trans. Ent. Soc. Lond., 1902, p. 626.

Described by Swinhoe from Japan.
Type in British Museum.

Habitat. JAPAN.

257.

Boarmia repulsaria.

Boarmia repulsaria, Walk., Cat. Lep. Het., xxi, p. 374 (1860).

A male specimen from Tarumidzu, Ōsumi, September, 1895.
Hitherto unrecorded from Japan.

Local distribution. KYŪSHŪ.
General distribution. HONGKONG; JAPAN.
Collection number, 532.

Genus MEDASINA.

Moore, Lep. Ceyl., iii, p. (408 1886); Hampson, Fauna Brit. India, Moths, iii, p. 283 (1895).

258.

Medasina nikkonis.

Boarmia nikkonis, Butl., Trans. Ent. Soc. Lond., 1881, p. 406.

Tephrosia biundularia, Leech, Ann. and Mag. Nat. Hist. (6), xix, p. 337 (1897) (part).

A fine series of five males and one female taken at Hakodate, in April and May, 1902, and one unlocalised specimen probably taken at Nikko. These specimens are larger, paler, and less powdered with fuscous than the type.

Unrecorded by Leech from Japan, but included by him as a synonym of *T. biundularia*, Borkh.

One male specimen only, the type, in the National Collection from Nikko.

Local distribution. YEZO; HONDO.

Habitat. JAPAN.

Collection number, 525.

Genus ECTROPIS.

Hübner, Verz., p. 316 (1827); Hampson, Fauna Brit. India, Moths, iii, p. 256 (1895).

259.

Ectropis brunnearia.

Tephrosia brunnearia, Leech, Ann. and Mag. Nat. Hist. (6), xix, p. 339 (1897).

A series of six male and four female specimens taken at the following localities: Yoshino, Yamato, June and July, 1895, 1899, 1900, 1901; Kumamoto and Jinnai, Higo, May, 1893; Ishidzuchi-San and Ōhoki, Iyo, June and July, 1896.

Hitherto unrecorded from Japan.

Local distribution. HONDO; KYŪSHŪ; SHIKOKU.

General distribution. CENTRAL and WESTERN CHINA; JAPAN.

Collection number, 496.

260.

Ectropis consonaria.

Geometra consonaria, Hübn., Geom., pl. xxx, fig. 157 (1798).
Boarinea consonaria, Staud., Cat. Lep. pal. p. 343 (1901).

One male and one female taken at Hakodate, in May, 1902, and at Takao-San, near Tōkyo, in April, 1894.

Recorded by Staudinger from Japan, unrecorded by Leech.

One specimen in National Collection from Yokohama (*Pryer*).

Local distribution. HONDO.
General distribution. EUROPE; E. SIBERIA; JAPAN.
Collection numbers, 502*a* and 506.

261.

Ectropis praepicta.

Ectropis (?) *praepicta*, Warr., Nov. Zool., viii, p. 33 (1901).

Described by Warren from Yokohama; unrecorded by Leech.

Type ♀ in Tring Museum.

There is a coloured figure only of this species in the National Collection.

Local distribution. HONDO.
Habitat. JAPAN.

262.

Ectropis grisescens.

Ectropis grisescens, Warr. Nov. Zool., i, p. 434 (1894); *id.*, ab. *obliqua*, Warr., *l. c.*, p. 434.
Tephrosia grisescens, Leech, Ann. and Mag. Nat. Hist. (6), xix, p. 338 (1897).

Leech records the above species in his catalogue, but makes no mention of the aberration *obliqua* referred to by Warren, who remarks that *obliqua* "shows the simple formation of the cross lines much more plainly than typical *grisescens*."

Type of *grisescens* ♀, Ningpo.
Type of *obliqua* ♀, Hakodate.

Local distribution. YEZO.
General distribution. CHINA; JAPAN.

Genus ARICHANNA.

Moore, Proc. Zool. Soc. Lond., 1867, p. 658; Hampson, Fauna Brit. India, Moths, iii, p. 290 (1895).

263.

Arichanna jaguarinaria.

Arichanna jaguarinaria, Oberth., Étud. d'Ent., vi, p. 17 pl. ix, fig. 1 ; Hampson, Fauna Brit. India, Moths, iii, p. 295.

This species is recorded by Leech from China, but not from Japan. Hampson, however, records it from Japan.

General distribution. JAPAN; WESTERN CHINA; INDIA (Nágas).

Genus PERCNIA.

Guenée, Phal., i, p. 216 (1857); Hampson, Fauna Brit. India, Moths, iii, p. 306 (1895).

264.

Percnia exanthemata.

Cucula exanthemata, Moore, Lep. Atk., p. 266.
Percnia exanthemata, Hampson, Fauna Brit. India, Moths, iii, p. 308 (1895).

Three male specimens taken at the following localities: Shimoshiiba and Oteno, Hyūga, July, 1893; Yoshino, Yamato, June, 1891.

Hitherto unrecorded from Japan.

Local distribution. HONDO; KYŪSHŪ.
General distribution. SIKHIM; KHÁSIS; JAPAN.
Collection number, 581.

Genus ABRAXAS.

Leach, Edin. Encycl., ix, p. 134 (1815); Hampson, Fauna Brit. India, Moths, iii, p. 297 (1895).

265.

Abraxas sylvata.

Phalaena sylvata, Scop., Ent. Carn., p. 220 (1763).
Abraxas sylvata, Hampson, Fauna Brit. India, Moths, iii, p. 299 (1895); Leech, Ann. and Mag. Nat. Hist. (6), xix, p. 445 (1897).
Abraxas miranda, Butl., Ann. and Mag. Nat. Hist. (5), i, p. 441 (1878); Ill. Het. B. M., iii, p. 48, pl. lii, fig. 12 (1879).

Abraxas suffusa, Warr., Nov. Zool., i, p. 417 (1894).
Abraxas sylvata, ab. *continuata*, Warr., Nov. Zool., x, p. 269 (1903).

Type ♀ (*suffusa*), from Japan.

I have met with varieties of *sylvata* in most places worked by myself and collector; in Hondo, Kyūshū, Shikoko, and Yezo.

General distribution. EUROPE; E. SIBERIA (Amur); COREA; CENTRAL and WESTERN CHINA; JAPAN.

Collection number, 572.

Genus POGONOPYGIA.

Warren, Nov. Zool., i, p. 416, 681 (1894).

266.

Pogonopygia nigralbata.

Pogoropygia nigralbata, Warr., Nov. Zool., i, p. 681 (1894); Swinhoe, Trans. Ent. Soc. Lond., 1902, p. 635.
Pogonopygia nigralbata, var. *attenuata*, Warr., Nov. Zool., iv, p. 240 (1897).

Described by Warren from Japan, unrecorded by Leech. Type ♂ in Tring Museum (Khasia Hills). Type ♀ *attenuata* in Tring Museum (Selangor).

Local distribution. UNKNOWN.
General distribution. CENTRAL CHINA; KHASIA HILLS; MALAY PENINSULA (*Selangor*); JAPAN.

Sub-family *OENOCHROMINAE.*

Genus ABRAXAPHANTES.

Warren, Nov. Zool., p. 374 (1894); Hampson, Fauna Brit. India, Moths, iii, p. 314 (1895).

267.

Abraxaphantes mabillaria.

Erosia (?) *mabillaria*, Pouj., Ann. Soc. Ent. Fr., 1895, p. 311, pl. vi, fig. 12.
Palaeomystis mabillaria, Leech, Ann. and Mag. Nat. Hist. (6), vol. xix, p. 544 (1897).

Three female specimens taken in August, 1897, at Karuizawa, Shinano.

Hitherto unrecorded from Japan.

Local distribution. Hondo.
General distribution. Western China; Japan.
Collection number, 544.

Genus Ozola.

Walker, xxiv, p. 1080 (1862); Hampson, Fauna Brit. India, Moths, iii, p. 327 (1895).

268.

Ozola impedita.

Acidalia impedita, Walk., Cat. Lep. Het., xxiii, p. 766 (1861).
Zarmigethusa biangulifera, Moore, Lep. Atk., p. 263 (1888).
Ozola biangulifera, Swinh., Trans. Ent. Soc. Lond., 1894, p. 168.
Ozola impedita, Swinh., Lep. Het. Oxon. Mus., ii, p. 331 (1900).
Ozola impedita japonica, Prout, Gen. Ins., Geom., subfam. *Oenochrominae*, p. 94 (1910).

Two male specimens of var. *japonica* taken at Kiire, province of Satsuma, in July, 1895, and one male at Kumamoto, province of Higo, June, 1893.

Type of *impedita* in Oxford Museum.

"*Ozola japonica* differs from typical *impedita* in more ochreous tone, sharper and uninterrupted lines, the inner on forewing scarcely angulated in all, a distinct, gently-curved median line on hindwing, which is almost absent in typical *impedita*, subterminal black spots distinct throughout both wings, cell-spots of hindwing small (almost as in *sinuicosta*), underside much more unicoloured than in the type, with the apical cloud only quite weakly differentiated. Discocellulars of hindwing as in typical impedita.

"Kyūshū (Nagasaki two), three examples in collection Brit. Mus."—(Prout.)

Described from Japan by Prout.

Local distribution. Kyūshū.
General distribution. India (Sikhim, Khásis); Japan.
Collection number, 545.

Sub-family *LARENTIANAE.*

Genus LYGRANOA.

Butler, Ann. and Mag. Nat. Hist. (5), i, p. 402 (1878).

269.

Lygranoa confusa. (Plate XXXI, fig. 8.)

Lygranoa confusa, Warren, ined.

Forewings greyish brown slightly tinged with purple; ante- and postmedial lines darker, originating in brown spots on the costa, the first line turns inwards below the costa and is slightly angled before the inner margin, the second line is bent outwards below the costa thence rather wavy to the inner margin. Hindwings slightly fuscous tinged. Fringes of all the wings grey brown, ochreous at base and whitish at tips, except at ends of the veins. Underside paler than above and without markings.

Expanse 28 mm.

Four male specimens taken at Yoshino, province of Yamato, in May, 1901; Junsai Numa and Hakodate, in July, 1902, 1903.

Male type received from Mr. Andrews, Hakodate (coll. Wileman).

In the National Collection at South Kensington there are four specimens of this species, which has been named by Warren, but the description has apparently never been published by him.

Local distribution. HONDO, Tōkyo, Yokohama, (*B. M.*); YEZO.

Habitat. JAPAN.

Collection number, 590.

Genus CARIGE.

Walker, Cat. Lep. Het., xxvi, p. 1631 (1862).

270.

Carige absorpta.

Carige absorpta, Warren, Nov. Zool., vi, p. 338 (1899).

Described by Warren from Japan, unrecorded by Leech.

Type in Tring Museum.

This species is represented by a coloured figure only in the National Collection.

Habitat. JAPAN.

Genus Philereme.

Hübner, Verz., p. 330 (1827).

271.

Philereme dubiosata.

Scotosia dubiosata, Walk., Cat. Lep. Het., xxv, p. 1352, (1862).
Philereme variegata, Warren.

A female specimen taken at Hakodate, July, 1902.
Hitherto unrecorded from Japan.

Local distribution. Yezo.
General distribution. Afghanistan; North-west Himalayas; Sikhim; Nilgiris; Japan.
Collection number, 596*b*.

Genus Collix.

Guenée, Phal., ii, p. 357 (1857).

272.

Collix hypospilata.

Collix hypospilata, Guen., Phal., ii, p. 358, 1481 (1857); Swinhoe, Trans. Ent. Soc. Lond., 1902, p. 647.
Collix subligata, Warr., Nov. Zool., iii, p. 385 (1896).
Phibalapteryx hypospilata, Hampson, Ill. Het. B. M., ix, pl. clxxi, fig. 26 (1893); *id.*, Fauna Brit. India, Moths, iii, p. 347 (1895).

A female specimen from Chiran, province of Satsuma, August, 1895.
Hitherto unrecorded from Japan.

Local distribution. Kūyshū.
General distribution. S. Africa; India; Ceylon; Japan.
Collection number, 660.

Genus Phibalapteryx.

Stephens, Ill. Brit. Ent. Haust., iii, p. 255 (1829); Hampson, Fauna Brit. India, Moths, iii, p. 346 (1895).

273.

Phibalapteryx semiorbiculata.

Phibalapteryx semiorbiculata, Chr., Bull. Mosc., ii, p. 103 (1880); Staud., Iris, x, p. 107, pl. iii, fig. 68; Cat. Lep. pal., i, p. 322 (1901).

Staudinger records this species from Japan, unrecorded by Leech.

General distribution. E. SIBERIA (Amurland, Ussuri); JAPAN.

Genus COENOCALPE.

Hübner, Verz., p. 274, 330 (1827).

274.

Coenocalpe stratata, sp. n. (Plate XXXI, fig. 2.)

♂. Light brown. Forewings traversed by a number of blackish, wavy lines; basal area rather darker, limited by a black line which is outwardly oblique to median nervure where it is indented, thence inwardly oblique to inner margin; ante- and postmedial lines black, the former elbowed below costa, the latter dentate about middle where it is distinctly black; submarginal line blackish, dentate, diffuse; discal dot black and the venation on outer half of the wings marked with black. Hindwings traversed by a number of blackish lines all becoming indistinct towards the costa, the postmedial line black, discal dot blackish. Underside fuscous, all the wings have a black discal dot and a pale postmedial line.

Expanse 35 mm.

Male type from Gokanosho, Higo, September, 1895.

Two male specimens taken in the district of Gokanosho, Higo, in September and October, 1895, and one female specimen received from Mr. Andrews, Hakodate.

Local distribution. KYŪSHŪ; YEZO.

Habitat. JAPAN.

Seems to be most nearly allied to *C. intestinata*, Guen., from the United States.

Collection number, 597.

Genus EUSTROMA.

Hübner, Verz., p. 335 (1827).

275.

Eustroma pyropata.

Geometra pyropata, Hübn., Geom., fig. 328 (1805 ?); Staud., Cat. Lep. pal., p. 291 (1901).

A male specimen taken at Yoshino, Yamato, June, 1899.

Hitherto unrecorded from Japan.

Local distribution. Hondo.

General distribution. Europe; E. Siberia (Ussuri); Japan.

Collection number, 608.

276.

Eustroma porphyriata.

Cidaria porphyriata, Moore, Lep. Atk., p. 276 (1887); Hampson, Fauna Brit. India, Moths, iii, p. 360 (1895).
Cidaria multistriata, Butl., Ill. Het. B. M., vii, p. 119, pl. cxxxvii, fig. 21 (1889).

A series of five males and seven females taken at Yoshino, Yamato, in May, June and July, 1899, 1900, 1901, also at Jozanke, near Sapporo, Yezo, in August, 1896, and at Ōhoki, province of Iyo, July, 1896.

Hitherto unrecorded from Japan.

Local distribution. Hondo; Shikoku; Yezo.

General distribution. India; Sikhim; Japan.

Genus Cidaria.

Treitschke, Eur. Schmett., vi, 2, p. 140 (1828); Hampson Fauna Brit. India, Moths, iii, p. 349 (1895).

277.

Cidaria illitata, sp. n. (Plate XXXI, fig. 9.)

♂. Forewings the base and the inner marginal half of the wings blackish, the latter tinged with ferruginous towards the outer margin; there is a slightly darker antemedial band and a blackish cloud on the costa between it and the apical area which is blackish intersected by a white X-like mark; fringes blackish towards apex and white marked with blackish towards the inner margin. Hind-

wings fuscous, fringes white marked with blackish. Underside pale fuscous, the forewings tinged with ochreous.

Expanse 30 mm.

Male type from Ōhoki, Iyo, May, 1896.

Local distribution. SHIKOKU.
Habitat. JAPAN.
Collection number, 623.

278.

Cidaria postalbida, sp. n.

♂. Antennae finely ciliated. Forewings greyish brown tinged with fulvous; subbasal line blackish outwardly edged with whitish, angled below the costa; antemedial and postmedial lines blackish, the former outwardly oblique to median nervure, thence incurved to inner margin, the latter outwardly oblique from the costa, where it is edged with whitish, excurved beyond the cell thence wavy to the inner margin; submarginal line blackish outwardly edged with white, crenulate and parallel with the outer margin except towards the costa; discal mark black, linear, a black interrupted longitudinal streak on the middle third of inner margin, and some black internervular streaks on the outer margin below the apex. Hindwings whitish, discal dot black. Under surface whitish, forewings tinged with fuscous, an obscure discal mark and traces of postmedial and submarginal lines.

Expanse 34 mm.

The female is of a deeper colour and larger than the male, and the black longitudinal streak on the inner margin is more conspicuous.

Expanse of series, 30 mm. ♂, 36 mm. ♀

Resembles some forms of *Larentia comis*, Butl.

Male type from Tōkyo, April, 1895.

A series of eleven specimens, two males and nine females, taken at the following localities: Tōkyo, April, May and October, 1893, 1894, 1895; Yoshino, Yamato, May, 1901, October, 1900; Kōbe, November, 1900; Dorokawa, Yamato, July, 1894; Hakodate, July, 1902.

From the preceding dates it would appear that there are two broods in the year.

Local distribution. HONDO; YEZO.
Habitat. JAPAN.
Collection number, 644.

279.

Cidaria corylata.

Geometra corylata, Thunb., Ins. Suec., iv, p. 61, pl. iv, fig. 11 (1792).
Hydriomena corylata, Meyr., Trans. Ent. Soc. Lond., 1892, p. 73.
Cidaria fabrefactaria, Oberth., Étud. d'Ent., v, p. 56, pl. iv, fig. 15 (1880).
Thera granitalis, Butl., Trans. Ent. Soc. Lond., 1881, p. 426.

The form *granitalis* described by Butler from Yokohama was recorded by Leech under *C. saturata* (Ann. and Mag. Nat. Hist. (6), xix, p. 652.

One male specimen of this taken at Haramachi, province of Higo, July, 1893.

Local distribution. Hondo, Yokohama (*Fenton*), type, Tōkyo (*Pryer*); Yezo (*Pryer*); Kyūshū (*Wileman*).
General distribution. Europe; E. Siberia; Japan.
Collection number, 617.

Genus Coremia.

Guenée, Phal., ii, p. 408 (1857).

280.

Coremia plumbeotincta.

Coremia plumbeotincta, Swinh., Ann. and Mag. Nat. Hist. (6), xvi, p. 297 (1891).

Six male and five female specimens taken in the following localities: Yoshino, Yamato, June, July and September, 1895, 1899, 1900, 1901. Junsai Numa and Ishikawa, province of Oshima, Yezo, May, 1902.

Hitherto unrecorded from Japan.

Local distribution. Hondo; Yezo.
General distribution. India (Khásis, Sikhim, Simla); S. India (Shillong, type); Japan.
Collection number, 628.

Genus Larentia.

Treitschke, Eur. Schmett., vi, 2, p. 75 (1828); Hampson Fauna Brit. India, Moths, iii, p. 367 (1895).

281.

Larentia saxea, sp. n.

♂. Basal three-fourths of forewings purplish brown, tinged with chestnut brown between the black subbasal and antemedial lines; postmedial line black, wavy, outwardly edged with whitish, limiting the basal three-fourths; marginal fourth chestnut brown clouded with purplish brown towards the apex; a whitish blotch below the middle; submarginal line whitish, wavy; fringes whitish tinged with chestnut brown. Hindwings and underside dark fuscous.

Expanse 24 mm.

Male type from Dorokawa, Yamato, August, 1894.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 629.

282.

Larentia semistrigata.

Larentia semistrigata, Chr., Bull. Mosc., ii, p. 99 (1880); Staud., Iris, x, p. 102, pl. iii, fig. 63; Cat. Lep. pal., i, p. 305 (1901).

Staudinger records this species from Japan, unrecorded by Leech.

General distribution. E. SIBERIA (Amurland, Ussuri); JAPAN.

Genus AMOEBOTRICHA.

Warren, Nov. Zool., viii, p. 26 (1901).

283.

Amoebotricha correlata.

Amoebotricha correlata, Warr., Nov. Zool., viii, p. 26 (1901).

Described by Warren from one specimen of each sex taken at Gifu, Japan. He remarks, "the insect bears great resemblance to *A. badiata*, Hübn., under which name I believe it has been recorded by Mr. Leech in Ann. and Mag. Nat. Hist., 1897, i, p. 659."

Local distribution. HONDO.
Habitat. JAPAN.

Genus Operophtera.

Hübner, Verz., p. 321 (1827).

284.

Operophtera relegata.

Oporabia nexifasciata, Leech, Ann. and Mag. Nat. Hist. (6) xix, p. 671 (1897) (*nec* Butl.).
Operophtera relegata, Prout, Entom., xli, p. 76 (1908).

Recorded by Leech from Japan as *Oporabia nexifasciata*, separated by Prout and renamed.

Local distribution. Hondo, Yokohama (*Pryer*).
Habitat. Japan.

285.

Operophtera japonaria.

Oporabia japonaria, Leech, Entom., suppl., p. 48 (May, 1891); Ann. and Mag. Nat. Hist. (6), xix, p. 671 (1897).
Operophtera japonaria, Prout., Entom., xli, p. 77 (1908).

Recorded by Leech from Japan as *Oporabia japonaria*, transferred to Genus *Operophtera* by Prout.

Local distribution. Hondo, Yokohama (*Pryer*).
Habitat. Japan.

Genus Amoebe.

Hübner, Verz., p. 333 (1827).

286.

Amoebe bidentata.

Phalaena bidentata, Rott., Naturfor., xi, p. 75 (1777).
Phalaena sagittata, Fabr., Mant., p. 210 (1787).
Larentia sagittata, Staud., Cat. Lep. pal., p. 308.

Two male specimens taken at Karuizawa, province of Shinano, and Junsai Numa, province of Oshima, Yezo, in July and September, 1895 and 1902.

In these specimens the whole of the central fascia of forewings is much narrower than in European specimens,

and the lower half towards inner margin is reduced to three dots.

Hitherto unrecorded from Japan.

Local distribution. Hondo; Yezo.
General distribution. Europe; E. Siberia; Japan.
Collection number, 540.

Genus Pomasia.

Guenée, Phal., i, p. 427 (1857); Hampson, Fauna Brit. India, Moths, iii, p. 388 (1895).

287.

Pomasia denticlathrata.

Pomasia denticlathrata, Warren, Proc. Zool. Soc. Lond., 1893, p. 367; Hampson, Fauna Brit. India, Moths, iii, p. 388 (1895).

Two male specimens taken at Kagoshima, Satsuma, July, 1895, and at Kiyotaki, Hyūga, September, 1895.

Hitherto unrecorded from Japan.

Local distribution. Kyūshū.
General distribution. Khásis; Nágas; Japan.
Collection number, 740.

Genus Eupithecia.

Curtis, Brit. Ent., vi, pl. lxiv (1825); Hampson, Fauna Brit. India, Moths, iii, p. 398 (1895).

288.

Eupithecia sordidata, sp. n.

♂. Forewings greyish brown, finely powdered with darker atoms; subbasal and antemedial lines black, both obtusely angled below the costa, but the first is indistinct; medial line black, sinuous, the outer edge paler than the ground-colour; postmedial line black, slightly incurved from the costa to vein 6, thence slightly wavy and almost parallel with the outer margin; submarginal line pale, sinuous, edged at the middle and the extremities with blackish, not clearly defined; discal spot black elongate. Hindwings pale fuscous grey with black discal dot and blackish postmedial line, the latter indistinct towards the costa. Fringes greyish, preceded by a black

line. Underside fuscous, all the wings have a discal mark and a postmedial line.

Expanse, 25 mm. ♂, 28 mm. ♀.

One male and one female specimen taken at Tōbetsu, Oshima, in June, 1902.

Local distribution. YEZO.
Habitat. JAPAN.
Collection number, 695.

289.

Eupithecia virgaureata.

Eupithecia virgaureata, Dbld. (H.), Newman's Brit. Moths, p. 127 (1867); Staud., Cat. Lep. pal., i, p. 312 (1901).
Eupithecia pimpinellata, Guén., ii, 325 (*nec* Hb.).

Staudinger records this species from Japan, unrecorded by Leech.

General distribution. EUROPE; ARMENIA; SIBERIA; JAPAN.

290.

Eupithecia actaeata.

Eupithecia actaeata, Walderdorff, Corr. z. m., V, 1869, p. 82 (Jun.).
Tephroclystia actaeata, Staud., Cat. Lep. pal., i, p. 312 (1901).

Staudinger records this species from Japan with a query as to whether it is a variety; unrecorded by Leech.

General distribution. EUROPE; USSURI; JAPAN (*var.* ?).

Genus TRICHOPTERYX.

Hübner, Verz., p. 323 (1827); Hampson, Fauna Brit. India, Moths, iii, p. 404 (1895).

291.

Trichopteryx viretata.

Geometra viretata, Hübn., Eur. Schmett., Geom., pl. xliv, fig. 230 (*ante* 1803).

Trichopteryx virctata, Hübn., Verz., p. 323; Hampson, Fauna Brit. India, Moths, iii, p. 405; Meyrick, Trans. Ent. Soc. Lond., 1892, p. 62; Leech, Ann. and Mag. Nat. Hist. (6), xx, p. 74 (1897).

Lobophora virctata, Steph., Ill. Brit. Ent. Haust., iii, p. 278; Guen., Phal., ii, p. 368; Staud., Cat. Lep. pal., i, p. 287 (1901).

Staudinger records this species from Japan, unrecorded by Leech.

General distribution. EUROPE; URAL; INDIA (Dharmsála, Sikhim, Khásis); WESTERN CHINA; E. SIBERIA (Ussuri); JAPAN.

292.

Trichopteryx insontata.

Lobophora insontata, Chr., Bull. Mosc., ii, p. 90 (1880); Staud., Iris, x, p. 74, pl. iii, fig. 46; Cat. Lep. pal., i, p. 287 (1901).

Staudinger records this species from Japan, unrecorded by Leech.

General distribution. AMURLAND; USSURI; JAPAN.

293.

Trichopteryx ustata.

Lobophora ustata, Chr., Bull. Mosc., 1880, ii, p. 91; Staud., Iris, x, p. 72; Cat. Lep. pal., i, p. 286 (1901).

Lobophora choaspitis, Oberth., Étud. d'Ent., x, p. 33, pl. i, fig. 10 (1884).

Trichopteryx choaspitis, Leech, Ann. and Mag. Nat. Hist. (6), xx, p. 74 (1897).

Two male and five female specimens taken at Hakodate and Junsai Numa, in April and May, 1902. *Choaspitis*, Oberth., which is recorded by Leech from Japan, is referred by Staudinger to *ustata*, Chr., which has priority.

Local distribution. HONDO; YEZO.

General distribution. E. SIBERIA (Amurland, Ussuri, Askold); JAPAN.

Collection number, 640.

Genus ASTHENA.

Hübner, Verz., p. 310 (1827); Hampson, Fauna Brit. India, Moths, iii, p. 417 (1895).

294.

Asthena remissa, sp. n.

♂. Grey faintly tinged with purple. Forewings have three transverse lines, the first and third sinuous; traces of similar lines on the hindwings.

Expanse 22 mm.

Male type from Iida-San, Higo, May, 1899. Two male and seven female specimens taken in the following localities: Junsai Numa, Oshima, July, 1902; Iida-San, Higo, May, 1899; Yoshino, Yamato, June and July, 1895, 1899, 1900, 1901 and 1902.

Expanse of series 18 mm. to 22 mm.

Local distribution. Hondo; Yezo.

Habitat. Japan.

Collection number, 743.

295.

Asthena anseraria.

Acidalia anseraria, Herr-Schäff Eur. Schmett., vi, p. 134, suppl., 560 (1856); Staud., Cat. Lep. pal., p. 308 (1901).

Cidaria soldaria, Turati, Bull. Ent. It., xi, p. 186, pl. viii, figs. 11, 12 (1879).

Staudinger records this species from Japan, unrecorded, by Leech.

General distribution. Europe; E. Siberia; Japan.

Genus Hastina.

Moore, Lep. Atk., p. 260 (1888); Hampson, Fauna Brit. India, Moths, iii, p. 422 (1895).

296.

Hastina caeruleolineata.

Hastina caeruleolineata, Moore, Lep. Atk., p. 260 (1888); Hampson, Fauna Brit. India, Moths, iii, p. 422 (1895).

A female specimen taken at Jozanke, near Sapporo, Yezo, August, 1896.

Hitherto unrecorded from Japan.

Local distribution. Yezo.

General distribution. Sikhim; Japan.

Collection number, 550.

Genus PSEUDOSTEGANIA.

Butler, Trans. Ent. Soc., p. 416 (1881); Hampson, Fauna Brit. India, Moths, iii, p. 417 (1895).

297.

Pseudostegania defectata.

Larentia defectata, Chr., Bull. Mosc., p. 108 (1880); Staud., Iris, x, p. 103, pl. iii, fig. 65; Cat. Lep. pal., i, p. 306 (1901).

Pseudostegania chrysidia, Butl., Trans. Ent. Soc. Lond., 1881, p. 417; Leech, Ann. and Mag. Nat. Hist. (6), xx, p. 86 (1897).

Two male and four female specimens taken as follows: Hakuchi, Awa, September, 1896; Ōhoki and Komatsu, Iyo, June and July, 1896; Hashō, Ise, October, 1894; Imoseyama, Yamato, June, 1894; Koya-San, Kishū, September, 1894.

Described from Japan by Butler under the name *chrysidia*, and recorded by Leech under this name. Christoph, however, described it as *defectata*, which name has priority.

Local distribution. SHIKOKU; HONDO.

General distribution. E. SIBERIA (Ussuri); COREA; JAPAN.

Staudinger in his Catalogue refers to this species as *chrysidice*, instead of *chrysidia*. This is evidently a clerical error, or printer's mistake, as he quotes the reference to Butler's description quite correctly.

Collection number, 697.

Sub-family *ACIDALIANAE.*

Genus ACIDALIA.

Treitschke, Eur. Schmett., v, 2, p. 438 (1825); Hampson, Fauna Brit. India, Moths, iii, p. 436 (1895).

298.

Acidalia corrivalaria.

Acidalia corrivalaria, Kretsch., Berl. ent. Zeit., 1862, p. 136, pl. i, fig. 6 *a*, *b*; Staud., Cat. Lep. pal., i, p. 275 (1901).

? *Acidalia sylvestraria*, Herr-Schäff., 106–7.

Staudinger records this species from Japan with a query as to whether it is a variety. Unrecorded by Leech.

General distribution. EUROPE; E. SIBERIA (Amurland, Ussuri); COREA; JAPAN (*var.*?).

299.

Acidalia imbella.

Craspedia imbella, Warren, Nov. Zool., viii, p. 22 (1901).

Described by Warren from Japan, unrecorded by Leech. Type ♀ in Tring Museum.

Habitat. JAPAN.

300.

Acidalia apicipunctata.

Acidalia apicipunctata, Chr., Bull. Mosc., ii, p. 54 (1880); Püng., Iris, x, p. 362; Staud., Cat. Lep. pal., i, p. 275 (1901).

Staudinger records the species from Japan, unrecorded by Leech.

General distribution. E. SIBERIA (Ussuri); JAPAN.

301.

Acidalia ignobilis.

Craspedia ignobilis, Warren, Nov. Zool., vii, p. 22 (1901).

Described by Warren from Japan.
Type ♀ in Tring Museum.

Habitat. JAPAN.

302.

Acidalia nudaria.

Acidalia nudaria, Chr., Bull. Mosc., ii, p. 44 (1880); Staud., Iris, x, p. 15, pl. i, fig. 6; Cat. Lep. pal., i, p. 268 (1901).

Staudinger records this species from Japan, unrecorded by Leech.

General distribution. E. SIBERIA (Amurland); JAPAN.

303.

Acidalia lauta.

Ptychopoda lauta, Warren, Nov. Zool., viii, p. 25 (1901).

Described by Warren from Japan.
Type ♂ in Tring Museum.

Habitat. JAPAN.

304.

Acidalia (?) *inchoata*, sp. n.

♂. Forewings grey brown powdered with black scales and suffused with pink on the median area; ante- and postmedial lines blackish, edged with whitish, both wavy, the latter outwardly curved round end of the cell; submarginal line whitish, highly sinuous. Hindwings similar to the forewings. All the wings have a blackish discal mark, and the fringes are whitish, preceded by a crenulate black line. Underside whitish, with traces of tranverse lines.
Expanse 20 mm.

Male type from Yoshino, Yamato.
Seven male specimens and one female taken at Yoshino, Yamato, in June, July, August and September, 1895, 1899, 1900; also taken at Mizazaki and Takanabe, Hyūga, in September and October, 1895; and at Kanoya, Ōsumi, September, 1895.

Local distribution. HONDO; KYŪSHŪ.
Habitat. JAPAN.
Collection numbers, 1389, 1724.

305.

Acidalia indeterminata.

Ptychopoda indeterminata, Warren, Nov. Zool., viii, p. 25, (1901).

One female specimen from Iidá-San, Higo, taken in May, 1895.

Local distribution. KYŪSHŪ (*Wileman*); HONDO, Oiwake (*Pryer*).
General distribution. INDIA (Simla, type); W. and CENTRAL CHINA; TIBET; COREA; JAPAN.
Collection number, 726.

306.

Acidalia holosericata.

Acidalia holosericata, Dup., Lép. France, suppl., iv, p. 109, pl. lix, fig. 7; Hampson, Fauna Brit. India, Moths, iii, p. 440 (1895).

A series of four males and ten females taken at Kōsa-dake, Karimata-dake, Iida-San, and Mifune, in province of Higo, May and June, 1893, 1895; also at Yoshino, Yamato, in May, June, July, and September, 1895, 1900 and 1901.

Hitherto unrecorded from Japan.

Local distribution. Hondo; Kyūshū; May to September.

General distribution. Europe; N.W. Himalayas; Sikhim; Japan.

Collection numbers, 724, 727, 728, 729.

Sub-family *GEOMETRINAE.*

Genus Uliocnemis.

Warren, Proc. Zool. Soc. Lond., 1893, p. 355.

307.

Uliocnemis nigromacularia.

Euchloris nigromacularia, Leech, Ann. and Mag. Nat. Hist. (6), xx, p. 237 (August, 1897).

Uliocnemis delicatior, Warr., Nov. Zool., iv, p. 391 (December, 1897).

Leech described this species in August, 1897, from two females taken at Chow-pin-sa, Western China, and Yokohama (?); and it was redescribed by Warren in December of the same year under the name of *delicatior*. Although already described from Japan by Leech, I include it in view of the addition to its synonymy. I have a long series of twenty-nine males and nine females taken at Yoshino, Yamato, in June, July, August, September and October, 1899, 1900, 1901, and also one female specimen from Nikko, July, 1894.

Expanse of series, from 22 mm. ♂, to 35 mm. ♀.

The males vary greatly in size.

Warren states that *amoenaria*, Oberth., is closely allied to this species, but has only two reddish spots.

Local distribution. HONDO; June to October.
General distribution. WESTERN CHINA; JAPAN.
Collection number, 766.

Genus HEMITHEA.

Duponchel, Lép. France, iv, 2, p. 233 (1829); Hampson, Fauna Brit. India, Moths, iii, p. 490 (1895).

308.

Hemithea eluta, sp. n.

♂. Head whitish, wings pale green. Forewings have two whitish transverse lines, the antemedial is slightly wavy and turned inwards on the costa, the postmedial is almost parallel with the outer margin; the transverse lines are continued on the hindwings, but the outer one is angled before the middle and again beyond the middle. Fringes and underside whitish, the latter tinged with green.

Near *Hemithea marina*, Butler.

Expanse 18 mm.

Male type from Yoshino, Yamato, August, 1900. A series of seventeen males and ten females taken at Yoshino, Yamato, June, July, August and September, 1895, 1899, 1900; at Kōbe, July, 1901; Junsai Numa, Oshima, July, 1896, and at Kakizako, Higo, June, 1895

Expanse of series, 18 mm. to 24 mm. ♂, 20 mm. to 23 mm. ♀

Local distribution. HONDO; SHIKOKU; YEZO.
Habitat. JAPAN.
Collection number, 797.

309.

Hemithea disjuncta.

Hemithea disjuncta, Walk., Cat. Lep. Het., xxii, p. 595; Moore, Lep. Ceyl., iii, pl. cxcvi, fig. 5; Hampson, Fauna Brit. India, Moths, iii, p. 492 (1895).

This species is recorded by Hampson from Japan; there are, however, no specimens from Japan in the National Collection.

Unrecorded by Leech.

General distribution. SIKHIM; KHÁSIS; GANJAM; CANARA; NILGIRIS; CEYLON; JAPAN.

310.

Hemithea aliboundulata.

Memoria aliboundulata, Hedem., Hor. ent. Ross., xiv, p. 511, pl. iii, fig. 8 (1879); Staud., Cat. Lep. pal., p. 265 (1901).

Two female specimens taken at Yoshino, Yamato, in June, 1895, and August, 1900.

Hitherto unrecorded from Japan.

Local distribution. Hondo; Yoshino.
General distribution. E. Siberia (Amurland); Japan.
Collection number, 790.

311.

Hemithea vacua.

Hemithea vacua, Swinhoe, Trans. Ent. Soc. Lond., 1902, p. 671.

Described from Japan by Swinhoe. One male specimen taken at Ōyama, Sagami, in June, 1896.

Local distribution. Hondo.
Habitat. Japan.
Collection number, 780.

Genus Geometra.

Linn. Syst. Nat., i, 2, p. 858 (1767); Hampson, Moths India, iii, p. 495 (1895).

312.

Geometra vernaria.

Geometra vernaria, Hübn., Beitr., i, 4, 1, D., p. 6 (1789); Staud., Cat. Lep. pal., i, p. 261 (1901).

Staudinger records this species from Japan with a query as to whether it is a variety or a distinct species. Unrecorded by Leech.

General distribution. Europe; Asia Minor; Altai; W. Turkestan (Issyk-kul); E. Siberia (Amurland, Ussuri); Ili (*var.*); Japan (*var.*? or different species?).

Genus Megalochlora.

Meyrick, Trans. Ent. Soc. Lond., 1892, p. 95.

313.

Megalochlora mandarinaria.

Megalochlora mandarinaria, Leech, Ann. and Mag. Nat. Hist. (6), xx, p. 235 (1897).

Three male and two female specimens; one received from Mr. Andrews, Hakodate, the other four were taken at Junsai Numa and Tōbetsu, Oshima, in July, 1896, 1902, 1903, and at Tōkyo in April, 1894. In these examples there are traces of a whitish submarginal line on all the wings.

Hitherto unrecorded from Japan.

Local distribution. HONDO; YEZO.
General distribution. WESTERN CHINA; JAPAN.
Collection number, 757.

314.

Megalochlora dieckmanni.

Geometra dieckmanni, Graes., Berl. ent. Zeit, 1888, p. 384; Staud., Iris, x, p. 5.
Megalochlora dieckmanni, Staud., Cat. Lep. pal., i, p. 261 (1901).

Staudinger records this species from Japan. Unrecorded by Leech.

General distribution. E. SIBERIA (Ussuri); JAPAN.

Genus EUCHLORIS.

Hübner, Verz., p. 283 (1827); Meyrick, Trans. Ent. Soc. Lond., 1892, p. 94.

315.

Euchloris amoenaria.

Phorodesma amoenaria, Oberth., Étud. d'Ent., v, p. 48, pl. ix, fig. 4 (1880).

Two male specimens taken at Yoshino, Yamato, in August and September, 1899, and 1900.

Near *E. bajularia*, Schiff.

Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. E. SIBERIA (Ussuri); JAPAN.
Collection number, 772.

Genus NEMORIA.

Hübner, Verz., p. 285 (1827); Hampson, Fauna Brit. India, Moths, iii, 1895, p. 501.

316.

Nemoria plana, sp. n.

♀. Light green, fringes whitish. Differs from *N. viridata*, L., in being without transverse lines.

Expanse 24 mm.

The costal area of forewings is broadly ochreous, but as this colour extends further on one side than on the other it is probably a stain resulting from contact with moisture. Female type from Odai-San, Yamato, July, 1894.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 795.

317.

Nemoria amphitritaria.

Nemoria amphitritaria, Oberth., Étud. d'Ent., v, p. 49, pl. iv, fig. 8; Staud., Iris, x, p. 10; Püng., *ib.*, 362; Staud., Cat. Lep. pal., i, p. 264 (1901).

Staudinger records this species from Japan. Unrecorded by Leech.

Five male specimens taken at Yoshino, Yamato, in May, August, September, and October, 1899, 1900.

Local distribution. HONDO.
General distribution. E. SIBERIA (Ussuri); JAPAN.
Collection numbers, 790, 791, 791*a*.

318.

Nemoria gelida.

Nemoria gelida, Butl., Ill. Het. B. M., vii, p. 104, pl. cxxxvi, fig. 5 (1889); Leech, Ann. and Mag. Nat. Hist. (6), vol. xx, p. 240 (1897); Hampson, Fauna Brit. India, Moths, iii, p. 502 (1895).

One male specimen taken at Yoshino, Yamato in August, 1900.

Hitherto unrecorded from Japan.

Local distribution. HONDO.

General distribution. DALHOUSIE; KULU; DHARMSÁLA; WESTERN CHINA; JAPAN.

Collection number, 793.

Genus GELASMA.

Warren, Proc. Zool. Soc. Lond., 1893, p. 352 ; Hampson, Fauna Brit. India, Moths, iii, p. 507 (1895).

319.

Gelasma ambigua.

Thalassodes ambigua, Butl., Ill. Het. B. M., ii, p. 49, pl. xlvi, fig. 6 (1878); Leech, Ann. and Mag. Nat. Hist. (6), xx (1897).

Iodis dentifascia, Warr., Nov. Zool., iv, p. 212 (1897).

Gelasma ambigua, Swinhoe, Trans. Ent. Soc. Lond., 1902, p. 674.

Type, Japan, in B. M.

Type (*dentifascia*), Japan, in collection Rothschild.

Recorded by Leech from Japan and redescribed by Warren. Warren remarks, "Distinguished from both *obliterata*, Walker, from China, and *unifascia*, Hampson, from India, by its green face and dentate outer line."

Local distribution. HONDO, Oiwake (*Pryer*), Nagahama (*Leech*).

General distribution. CHINA (Ningpo); COREA; JAPAN.

320.

Gelasma flagellaria.

Hemithea flagellaria, Pouj., Ann. Soc. Ent. Fr., p. 310, pl. vi, fig. 8 (1895).

Gelasma albistrigata, Warr., Nov. Zool., ii, p. 89 (1895).

Thalera flagellaria, Leech, Ann. and Mag. Nat. Hist. (6), xx, p. 244 (1897).

Gelasma flagellaria, Swinhoe, Trans. Ent. Soc. Lond., 1902, p. 674.

Type, Moupin, in collection Poujade.

Type (*albistrigata*), Japan, in collection Rothschild.

Recorded from Japan by Warren, unrecorded by Leech, who only gives China.

General distribution. CENTRAL and W. CHINA; JAPAN.

Genus THALASSODES.

Guenée, Phal., i, p. 359 (1857); Hampson, Fauna Brit. India, Moths, iii, p. 507 (1895).

321.

Thalassodes infracta, sp. n. (Plate XXX, fig. 16.)

♂. Green. Antennae finely ciliated; vertex of head white, frons ochreous, anal segments of abdomen whitish. Forewings have the costa ochreous marked with brown; antemedial line white, wavy, but only clearly defined towards the inner margin; postmedial line white, sinuous, indistinct towards the costa, terminating on the inner margin in a pink-tinged whitish patch which has some brown scales on it before the outer angle; a whitish spot on the outer margin at vein 4. Hindwings have a postmedial irregular white line which limits the pink-tinged whitish outer marginal border from the costa to vein 5, this border has some patches of brown scales on it, and is interrupted by the ground-colour between veins 2 and 3. Fringes pinkish grey preceded by an interrupted black line. Underside whitish tinged with green; forewings have a purplish brown discal dot and there is a spot of the same colour at the costal angle of outer margin.

Expanse 32 mm.

Male type from Suma, near Kōbe, August, 1901. Four male specimens taken at Suma, Settsu and Yoshino, Yamato, in August, 1900, 1901. Expanse of series 28 to 32 mm.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 767.

322.

Thalassodes marinaria.

Thalassodes marinaria, Guen., Phal., i, p. 361 (1857); Hampson, Fauna Brit. India, Moths, iii, p. 508 (1895).
Geometra dicissa, Wlk., Cat. Lep. Het., xxii, p. 517.
Geometra penicillata, Wlk., Cat. Lep. Het., xxii, p. 525.

One male and one female specimen taken at Yoshino, Yamato, and Kagoshima, Satsuma, in August and September, 1901 and 1898.

Hitherto unrecorded from Japan.

Local distribution. HONDO; KYŪSHŪ.
General distribution. MOULMEIN; BOMBAY; JAPAN.
Collection number, 774.

323.

Thalassodes grandificaria.

Thalera grandificaria, Graes., Berl. ent. Zeit., p. 266 (1889); Staud., Iris., x, p. 2, pl. i, fig. 3; ? *illiturata,* Walk. (nom. vet. *sec.* Hampson), Staud., Cat. Lep. pal., p. 264 (1901).

Ten male specimens taken at Yoshino, Yamato, in June and July, 1895, 1900.

Recorded by Staudinger from Japan, unrecorded by Leech.

Four specimens in the National Collection from Japan and one from Corea.

Local distribution. HONDO.
General distribution. COREA; N. CHINA; JAPAN.

Genus THALERA.

Hübner, Verz., p. 285 (1827); Hampson, Fauna Brit. India, Moths, iii, p. 514 (1895).

324.

Thalera ingrata, sp. n.

♂. Head white, wings pale green. Forewings have a whitish, outwardly oblique, antemedial line, and a whitish submarginal line, the latter is outwardly oblique, undulated, and terminates at the outer angle; all the wings have a dusky but inconspicuous discal dot. Underside whitish tinged with green.

Expanse 32 mm.

Male type from Nikko, August, 1893.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 794.

Genus DITHECODES.

Warren, Nov. Zool., vii, p. 102 (1900).

325.

Dithecodes erasa.

Dithecodes erasa, Warren, Nov. Zool., vii, p. 102 (1900).

Described by Warren from Japan.
Type ♀ in Tring Museum.

Habitat. JAPAN.

Genus AGRAPTOCHLORA.

326.

Agraptochlora marginata.

Agraptochlora marginata, Warren, Nov. Zool., i, p. 390 (1894); Swinhoe, Trans. Ent. Soc. Lond., 1902, p. 677

Type ♀ in collection Rothschild, from Tiapang.

Swinhoe, in a list of species not included in the B. M., gives Japan as the locality for this species. Tiapang, however, is not a Japanese name, and Mr. Warren informs me that the genus only occurs in South Africa.

Habitat. JAPAN (?).

Family SATURNIADAE.

Genus RHODINIA.

Rhodia, Moore, Proc. Zool. Soc. Lond., 1872, p. 578 (nom. praeoc.).
Rhodinia, Staud., Rom. sur Lép., vi, p. 327 (1892).

327.

Rhodinia fugax.

Rhodia fugax, Butl., Ann. and Mag. Nat. Hist. (4), xx, p. 480 (1877); Ill. Het. B. M., ii, pl. xxvi, fig. 1, (1878); Leech, Proc. Zool. Soc. Lond., 1888, p. 633; Trans. Ent. Soc. Lond., 1898, p. 268.
Saturnia diana, Oberth., Bull. Soc. Ent. Fr. (6), vi, pl. xlvii (1886).

The dark form, *diana*, Oberth., has not been recorded from Japan. I captured one male specimen of this form at Kōbe, and bred another male from the larva at Tōkyo on November 1, 1894. It may not perhaps be generally known that the larva of *R. fugax* emits a faint sound like the creaking of the branch of a tree moving in the wind. I have caught and bred typical *fugax*, Butler, both male and female, in October and November, 1893, at Tōkyo.

Local distribution. HONDO.
General distribution. E. SIBERIA (Ussuri); JAPAN
Collection number, 6*a*.

Family URANIADAE.

Genus Pseudomicronia.

Moore, Lep. Ceyl., iii, p. 461 (1887); Hampson, Fauna Brit. India, Moths, iii, p. 116 (1895).

328.

Pseudomicronia oppositata.

Micronia oppositata, Snell, Tidj. v. Ent., xxiv, p. 84 (1881).
Pseudomicronia coelata, Moore, Lep. Atk., p. 257 (1887); Hampson, Fauna Brit. India, Moths, iii, p. 116, fig. 61.

Three male specimens and one female taken at Kiire, Satsuma, in July, 1895. These agree best with an example from Java in the National Collection at South Kensington. Hitherto unrecorded from Japan.

Local distribution. Kyūshū.
General distribution. Sikhim; Khásis; Nilgiris; Ceylon; Borneo; Java; Ceram; Japan.
Collection number, 356.

Genus Psychostrophia.

Butler, Ann. and Mag. Nat. Hist. (4), xx, p. 401 (1877).

329.

Psychostrophia melanargia.

Ab. *albomaculata*, ab. nov. (Plate XXXI, fig. 1.)

Psychostrophia melanargia, Butl., Ann. and Mag. Nat, Hist. (4), xx, p. 401 (1877); Ill. Het. B. M., ii, p. 9, pl. xxiii, fig. 7 (1878); Leech, Proc. Zool. Soc. Lond., 1888, p. 612; Ann. and Mag. Nat. Hist. (6), xix, p. 189 (1897).

Ab. *albomaculata* differs from the type of *melanargia* in having all maculation and the bands of the fore- and hindwings of a pure white instead of yellow. One male and three female specimens taken at Hiko-San, Buzen, in June, 1893. I have not met with this variety anywhere else in Japan. Hiko-San is a mountain about 3000 ft.

above sea-level, and the specimens referred to were taken at an elevation of about 2000 ft.

Type from Hiko-San, Buzen, June, 1893.

Expanse 38 to 48 mm.

Local distribution. KYŪSHŪ.

Habitat. JAPAN.

Collection number, 366.

Genus DIRADES.

Walker, Cat. Lep. Het., xxxv, p. 1650 (1866); Hampson, Fauna Brit. India, Moths, iii, p. 132 (1895).

330.

Dirades prunaria.

Dirades prunaria, Moore, Lep. Ceyl., iii, p. 400 (1884–87); Hampson, Fauna Brit. India, Moths, iii, p. 134 (1895).

One female specimen taken at Miyazaki, Hyūga, in September, 1895.

Hitherto unrecorded from Japan.

Local distribution. KYŪSHŪ.

General distribution. CEYLON; JAPAN.

Collection number, 367.

Family PSYCHIDAE.

Sub-family *PSYCHINAE.*

Genus AMATISSA.

Walker, Journ. Linn. Soc., vi, p. 138 (1862); Hampson, Fauna Brit. India, Moths, i, p. 292 (1892).

331.

Amatissa consorta.

Amatissa consorta, Templ., Trans. Ent. Soc. Lond., v, p. 40, pl. v, figs. 6, 7 (larva case), (1847); Hampson, Fauna Brit. India, Moths, i, p. 292 (1892).

Amatissa inornata, Wlk., Journ. Linn. Soc., vi, p. 138 (1862).

Three male specimens taken at Yoshino, Yamato, May and June, 1900 and 1901.

Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. CEYLON (Colombo); BORNEO; JAPAN.
Collection number, 143.

Genus EURYCYTTARUS.

Eurukuttarus, Hampson, Ill. Het. B. M., viii, p. 66 (1891).
Eurycyttarus, Hampson, Fauna Brit. India, Moths, i, p. 299 (1892).

332.

Eurycyttarus andrewsi, sp. n.

♂. Black with brownish grey hair-like scales, and these are longer and denser on the basal area. Somewhat similar to *E. pileata*, Hampson, but the wings are rounder.

Male type from Hakodate, Yezo, in the National Collection. One male specimen received from Mr. Andrews, Hakodate.

Local distribution. YEZO.
Habitat. JAPAN.

Sub-family *OECETICINAE.*

Genus OIKETICOIDES.

Oiketicoides, Heyl., Ann. Soc. Ent. Belg., 1881, p. 66.
Oeceticoides, Hampson, Fauna Brit. India, Moths, i, p. 293 (1892).

333.

Oeceticoides nigraplaga, sp. n.

Closely allied to *Oe. bipars*, Walk., but the venation shows up more distinct, and the black marking occupies more of the basal area of the hindwings, and less of the forewings.
Expanse 19–28 mm.

Four specimens in the National Collection at South Kensington, two of which are from Japan; the other two are labelled Cherra and Sikhim respectively.

Local distribution. HONDO? (*Pryer*).
General distribution. CHINA; SIKHIM; JAPAN.

Family COSSIDAE.

Genus Cossus.

Fabricius, Ent. Syst., iii, pt. ii, p. 3 (1794); Hampson, Fauna Brit. India, Moths, i, p. 305 (1892).

334.

Cossus ligniperda.

Cossus ligniperda, Fabr.; Leech, Trans. Ent. Soc. Lond., 1898, p. 353.

A female taken in June, 1895, at Yoshino, Yamato. Hitherto unrecorded from Japan.

Local distribution. Hondo.

General distribution. Europe; Amurland; Corea; ?North China; Japan.

Collection number, 145.

Family LIMACODIDAE.

Genus Natada.

Walker, Cat. Lep. Het., v, p. 1108 (1855); Hampson Fauna Brit. India, Moths, i, p. 380 (1892).

335.

Natada conjuncta.

Limacodes (?) *conjuncta*, Walk., Cat. Lep. Het., v, p. 1150 (1855).

Natada neutra, Swinh., Trans. Ent. Soc. Lond., 1890, p. 195.

Plossa fimbriares, Walk., Cat. Lep. Het., xv, p. 1673.

Miresa cuprea, Moore, Lep. Atk., p. 74, pl. iii, fig. 8.

Heterogenea conjuncta, Fixs., Rom. sur Lép., iii, p. 338, pl. xv, fig. 9 (1887).

Natada conjuncta, Hampson, Fauna Brit. India, Moths, i, p. 381 (1892); Leech, Trans. Ent. Soc. Lond., 1899, p. 103.

One male specimen taken at Nikko in August, 1893. Hitherto unrecorded from Japan.

Local distribution. Hondo.

General distribution. North China; Formosa; Sikhim; Rangoon; E. Pegu; Japan.

Collection number, 184.

Genus MICROLEON.

Butler, Cist. Ent., iii, p. 121 (1885).

336.

Microleon (?) *rubicundula*, sp. n. (Plate XXX, fig. 14.)

♂. Head and thorax dark reddish brown, abdomen fuscous grey. Forewings reddish brown, a black mark at the base, and another at the outer extremity of the cell; antemedial line black, sinuous; postmedial line black, wavy, angulated below the costa, submarginal line black, wavy but indistinct; fringes preceded by a series of black dots on the venation. Hindwings whitish brown suffused with pinkish. Underside of forewings pinkish becoming whitish on the inner marginal area, a dusky discal mark; hindwings whitish suffused with pinkish on the costa and the outer margin.

Expanse 30 mm.

Male type from Kiire, Satsuma, July, 1895.

A series of six male and two female specimens taken in the following localities in July, August, September and October, 1895, 1899, 1901: Kiire, Satsuma; Yoshino, Yamato; Karuizawa, Shinano.

Local distribution. KYŪSHŪ; HONDO.

Habitat. JAPAN.

Collection number, 1087.

Genus HETEROGENEA.

Knoch, Beitr. Ins., iii, p. 60 (1793).

337.

Heterogenea dentatus.

Limacodes dentatus, Oberth., Diagn., p. 8; Étud. d'Ent., v, p. 42, pl. i, fig. 10 (1880).

Apoda dentatus, Kirby, Cat. Lep. Het., i, p. 552 (1892).

Heterogenea dentatus, Staud., Rom. sur Lép., vi, p. 298 (1892); Leech, Trans. Ent. Soc. Lond., 1899, p. 108.

A series of ten male specimens and one female taken at Yoshino, Yamato, in June, July, August and October, 1899, and at Nikko, in August, 1893.

Hitherto unrecorded from Japan.

Local distribution. HONDO.

General distribution. E. SIBERIA (Ussuri); COREA; JAPAN.

Collection number, 190.

338.

Heterogenea asella.

Bombyx asella, Schiff., Wien. Verz., p. 65 (1776).

A female specimen taken at Junsai Numa, Oshima, Yezo.

Hitherto unrecorded from Japan.

Local distribution. YEZO.

General distribution. EUROPE, ARMENIA; E. SIBERIA (Ussuri); JAPAN.

Genus EPIPOMPONIA.

Dyar, New York Journ. Ent. Soc., 1906, p. 14.

339.

Epipomponia nawai.

Epipyrops nawai, Dyar, Proc. Ent. Soc. Wash., vi, p. 19 (1904).

Described by Dyar from Japan.

Habitat. JAPAN.

Family ZYGAENIDAE.

Sub-family *CHALCOSIANAE.*

Genus HETERUSIA.

Eterusia, Hope, Trans. Linn. Soc. Lond., xviii, p. 445 (1841).

Heterusia, Hampson, Fauna Brit. India, Moths, i, p. 259 (1892).

340.

Heterusia aedea.

Papilio aedea, Clerck, Icon., pl. iv, fig. 2 (1759).

Heterusia aedea, Leech, Trans. Ent. Soc. Lond., 1898, p. 342; Hampson, Fauna Brit. India, Moths, i, p. 262 (1892).

Two males and one female taken in the following localities: Takaoka and Gokanoshō, Hyūga, Kyūshū, in September and October, 1895; Takakuma-yama, Ōsumi, Kyūshū, in September, 1895.

Hitherto unrecorded from Japan.

Local distribution. KYŪSHŪ.
General distribution. SYLHET; CENTRAL and WESTERN CHINA; JAPAN.
Collection number, 138.

Genus ERASMIA.

Hope, Trans. Linn. Soc. Lond., xviii, p. 446 (1841); Hampson, Fauna Brit. India, Moths, i, p. 273 (1892).

341.

Erasmia sangaica.

Erasmia sangaica, Moore, Ann. and Mag. Nat. Hist. (4), xx, p. 86 (1877); Leech, Trans. Ent. Soc. Lond., 1898, p. 346.

Probably a dark form of *E. pulchella*, Hope.
Five males and two females taken in the following localities: Kagoshima, Satsuma, July, 1895; Takanabe, Hyūga, October, 1895; Hashō, Ise, October, 1894.
Hitherto unrecorded from Japan.

Local distribution. KYŪSHŪ; HONDO.
General distribution. CHINA; JAPAN.
Collection number, 139.

Family DREPANIDAE.

Genus DREPANA.

Schrank, Faun. Boica, ii, 2, p. 155 (1802); Hampson, Fauna Brit. India, Moths, i, p. 305 (1892).

342.

Drepana harpagula.

Bombyx harpagula, Esp., iii, pl. lxxiii, figs. 1, 2 (1786).
Bombyx sicula, Hübn. (Bomb.), fig. 41 (1797).

A female specimen from Nikko taken in July, 1893.
Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. EUROPE; E. SIBERIA (Amurland); JAPAN.
Collection number, 167.

Genus MIMOZETHES.

Warren, Nov. Zool., viii, p. 190 (1901).

343.

Mimozethes argentilinearia.

Deectia argentilinearia, Leech, Ann. and Mag. Nat. Hist. (6), xix, p. 183 (1897).
Euchera (?) *nana*, Warr., *l. c.*, iv, p. 15 (1897).
Mimozethes nana, Warr., *l. c.*, viii, p. 191.
Mimozethes argentilinearia, Swinhoe, Trans. Ent. Soc. Lond., 1902, p. 586.

Type. Japan in B. M. (Hakodate, *Leech*).
Type (*nana*), Japan, in collection Rothschild.
Recorded by Leech from Japan as *Deectia argentilinearia*, and placed by him in Family *Epiplemidae*.

Local distribution. YEZO.
General distribution. JAPAN.

Family THYRIDIDAE.

Genus STRIGLINA.

Guenée, Ann. Soc. Ent. Fr., 1877, p. 283; Hampson, Fauna Brit. India, Moths, i, p. 353 (1892).

344.

Strigilina decussata.

Striglina decussata, Moore, Proc. Zool. Soc. Lond., 1888, p. 27, pl. vi, fig. 8; Hampson, Fauna Brit. India, Moths, i, p. 354 (1892).
Striglina duplicifimbria, Warr., Ann. and Mag. Nat. Hist. (6), xviii, p. 227.

Twelve male specimens taken at Yoshino, Yamato, in July, August and September, 1899 and 1900: at Ishidzuchi-San, Iyo, in June, 1896; at Takio and Iida-San, Higo, in May, 1899.
Hitherto unrecorded from Japan.

Local distribution. HONDO; SHIKOKU; KYŪSHŪ.
General distribution. INDIA (Sikhim, Assam, Nagas); E. PEGU; BORNEO; JAPAN.
Collection number, 1741.

Genus RHODONEURA.

Guenée, Phal., ii, pl. i, fig. 8 (1857).

345.

Rhodoneura aurea.

Pyrinioides aurea, Butler, Trans. Ent. Soc. Lond., 1881, p. 200; Leech, Trans. Ent. Soc. Lond., 1898, p. 376.
Camptochilus divergens, Warren, Nov. Zool., v, p. 222 (1898).

Recorded by Leech from Japan as *Pyrinioides aurea*, included on account of emendation in synonymy.

Local distribution. YEZO.
General distribution. CENTRAL and WESTERN CHINA; JAPAN.

Family PYRALIDAE.

Sub-family *CRAMBINAE.*

Genus CRAMBUS.

Fabricius, Ent. Syst., suppl., p. 464 (1798); Hampson, Fauna Brit. India, Moths, iv, p. 12 (1896).

346.

Crambus virgatellus, sp. n. (Plate XXXI, fig. 19.)

♂. Forewings silvery white with a brownish medial longitudinal streak which becomes diffuse towards the outer margin; a submarginal series of black dots and a brownish line precede the silvery fringes. Hindwings pale fuscous, fringes silvery white. Underside of forewings fuscous and of hindwings whitish tinged with fuscous.

Expanse 22 mm.

Male type from Ibaraki, April, 1899.

Two male specimens taken at Ibaraki and Kōbe, Settsu, in April, 1899.

Allied to *C. nivellus*, Koll.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 1430.

347.

Crambus bivittellus, sp. n.

♂. Forewings pale ochreous brown with a silvery median streak from base extending to the outer margin where it becomes diffuse.

Sparingly powdered with blackish scales above and below; a narrower silvery streak on the costa from the base to the outer margin; fringes of the ground-colour mixed with silvery. Hindwings silky white faintly tinged with pale fuscous on the subcostal area. Underside of forewings fuscous, and of hindwings whitish tinged with fuscous on the costal area.

Expanse 29 mm.

Somewhat resembles *C. simplex*, Butl., from New Zealand.

Male type from Yezo (*Andrews*).

Local distribution. YEZO.
Habitat. JAPAN.
Collection number, 1442.

348.

Crambus trifidalis, sp. n.

♂. Forewings brown with whitish costal and medial longitudinal streaks; the first is continued through to the outer margin, and the second becomes trifid towards the outer margin; fringes glossy and paler than the ground-colour, preceded by a black line. Hindwings whitish diffused with fuscous, except on the fringes.

Expanse 26 mm.

Allied to *C. tristellus*, Fab.

Male type from Japan (no locality label). Two male specimens received from Mr. Andrews, Hakodate.

Local distribution. YEZO.
Habitat. JAPAN.
Collection number, 1445.

Genus CHILO.

Zincken, Germar's Mag. Ent., ii, p. 33 (1817); Hampson, Fauna Brit. India, Moths, iv, p. 26 (1896).

349.

Chilo gensanellus.

Chilo gensanellus, Leech, Entom., xxii, p. 108, pl. v, fig. 9 (1899); Trans. Ent. Soc. Lond., 1901, p. 398.

Leech refers to specimens of this species from Hakodate in the "Entomologist" (*supra*), but does not give

Japan as a locality in his "Catalogue of *Heterocera* from China, Japan and Corea."

Local distribution. YEZO.
General distribution. COREA; JAPAN (?).

Sub-family *SCHOENOBIINAE.*

Genus LEECHIA.

South, Trans. Ent. Soc. Lond., 1901, p. 400.

350.

Leechia sinuosalis.

Leechia sinuosalis, South, Trans. Ent. Soc. Lond., 1901, p. 400, pl. xiv, fig. 15.

A female specimen taken at Yoshino, Yamato, July, 1900.

Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. CENTRAL CHINA; JAPAN.
Collection number, 1428.

Genus SCHOENOBIUS.

Duponchel, Cat. Lép. Eur., p. 312 (1844); Hampson, Fauna Brit. India, Moths, iv, p. 47 (1896).

351.

Schoenobius costalis, Moore.
var. *parvalis,* nov.

♂. White silky forewings, faintly tinged with fuscous, edge of costa darker. Underside as above, but the forewings are more deeply tinged with fuscous.

Expanse of type 22 mm.

Expanse of series, 18 mm. to 25 mm. ♂, 25 mm. to 29 mm. ♀.

Male type from Yokohama, August, 1898.

Appears to be referable to *S. costalis,* Moore, but it is smaller in size and the palpi are whitish. A series of six male and five female specimens taken at Yokohama in August, 1898, and Tōkyo, in September, 1893. The forewings of the female are whiter than those of the male, and show only very slight traces of fuscous tinge. The

underside is immaculate and not tinged with fuscous as in the male.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 1462.

352.

Schoenobius bipunctifera.

Tripanaea bipunctifera, Walk., Cat. Lep. Het., xxviii, p. 523 (1863).
Schoenobius bipunctifera, Moore, Lep. Ceyl., iii, p. 385, pl. clxxxiv, fig. 13 (1886); Hampson, Fauna Brit. India, Moths, iv, p. 48 (1896); Leech, Trans. Ent. Soc. Lond., 1901, p. 403.

Three female specimens taken at Takakuma-yama, Ōsumi, in September, 1895, and at Iida-San, Higo, in May, 1899.

Hitherto unrecorded from Japan.

Local distribution. KYŪSHŪ.
General distribution. CHINA; FORMOSA; throughout INDIA, CEYLON and BURMA; SUMATRA; JAVA; BORNEO; WESTERN CHINA; JAPAN.
Collection number, 1467.

Sub-family *ANERASTIANAE.*

Genus HYPSOTROPHA.

Zeller, Isis, 1848, p. 591; Hampson, Fauna Brit. India, Moths, iv, p. 54 (1896).

353.

Hypsotropha bipunctella, sp. n.

♀. Head and thorax whitish faintly tinged with brown. Forewings whitish ochreous, slightly tinged with pink and finely freckled with blackish; two black dots in the cell, one about the middle and the other at outer extremity, five black dots on outer margin. Hindwings whitish. Under surface similar to the upperside.
Expanse 26 mm.

Female type from Yoshino, Yamato, July, 1900.
Allied to *H. solipunctella*, Rag.
A series of nine female specimens taken at Yoshino

Yamato, and Komatsu, Iyo, in July and August, 1896, 1899, 1900.

Expanse of series 22 mm. to 26 mm.

Local distribution. HONDO; SHIKOKU.
Habitat. JAPAN.
Collection numbers, 1430 and 1431.

Genus POLYOCHA.

Zeller, Isis, 1848, p. 876 (1896); Hampson, Fauna Brit. India, Moths, iv, p. 61 (1896).

354.

Polyocha bifidella, sp. n. (Plate XXXI, fig. 22.)

♂. Head and thorax pale brown mixed with darker, abdomen greyish. Forewings pale brown, costa with a whitish streak tapering towards the apex and inwardly edged with dark brown; a dark brown streak is given off from the edging of the costal streak and runs under the cell; submarginal line indicated by some obscure blackish dots. Hindwings fuscous. Underside shining dark fuscous, paler on the inner margins.

Expanse 27 mm. to 34 mm.

Male type from Yoshino, Yamato, July, 1900.

This species seems to be most nearly allied to *P. diversella*, Rag.

Three male specimens: one taken at Yoshino, Yamato, July, 1900; one received from Mr. Andrews, Hakodate, and one taken at Kiire, Satsuma, July, 1895.

Local distribution. HONDO; YEZO; KYŪSHŪ.
Habitat. JAPAN.
Collection number, 1573.

355.

Polyocha (?) *venosella*, sp. n.

♂. Forewings pale pinkish brown, the veins darker and with brownish streaks between them. Hindwings pale fuscous becoming darker on apical portion of outer margin. Underside fuscous, inner marginal area of hindwings paler.

Expanse 28 mm.

Male type received from Mr. Andrews, Hakodate, Yezo, and another male specimen taken at Tōkyo in March, 1893.

Local distribution. YEZO; HONDO.
Habitat. JAPAN.
Collection number, 1585.

Genus EMMALOCERA.

Ragonot, Nouv. Gen., p. 38 (1888).

356.

Emmalocera leucocinctus.

Crambus (?) *leucocinctus*, Walk., Cat. Lep. Het., xxvii, p. 169 (1863).
Polyocha leucocincta, Hampson, Fauna Brit. India, Moths, iv, p. 62 (1896).
Emmalocera lucidicostella, Rag., Nouv. Gen., p. 38 (1888); *id.*, Mon. Phyc., pl. xxxv, fig. 20 (1894).

Two male specimens taken at Yoshino, Yamato, in June and September, 1900.
Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. N.W. HIMALAYAS; PUNJAB; ASSAM; BORNEO; JAPAN.
Collection numbers, 1553, 1553*a*.

Sub-family *PHYCITINAE.*

Genus NEPHOPTERYX.

Hübner, Verz., p. 370 (1827); Hampson, Fauna Brit. India, Moths, iv, p. 76 (1896).

357.

Nephopteryx trigonalis, sp. n. (Plate XXXI, fig. 21.)

♂. Forewings brownish grey with a pinkish tinge, medial two-fourths of costa whitish; antemedial line pale, curved, preceded by a blackish cloud on the inner marginal area, and followed by a triangular black spot on the costa, the apex of the latter only separated from the cloud by the transverse line; postmedial line pale, edged with blackish, slightly wavy, indented below costa and above inner margin; two black dots encircled with whitish at outer end of the cell. Hindwings and underside of all the wings fuscous.

Expanse 22–24 mm.

Male type from Yoshino, Yamato, July, 1900. Cotype from same locality, August, 1899.

Local distribution. HONDO.
Habitat. JAPAN.
Collection numbers, 1556 and 1558.

358.

Nephopteryx pauperculella, South, ined. sp. n.

♀. Forewings grey suffused with darker and tinged with rufous; antemedial line black, edged internally with white, almost straight; postmedial line black, outwardly edged with white, slightly sinuous; a double black dot at end of the cell; fringes grey, darker at their base. Hindwings pale fuscous. Under surface fuscous grey.

Expanse 22 mm.

One female specimen, taken by a native collector at Nikko, in Mus. Coll. (the type); and an example of the same sex, in my collection, from Yoshino, Yamato, June, 1900.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 1561.

359.

Nephopteryx bitinctella, sp. n.

♂. Forewings brownish, the inner marginal area paler; the median nervure is marked with blackish, and there are some blackish dots at the outer end of the cell; traces of a blackish, wavy, submarginal line. Hindwings and underside of all the wings pale fuscous.

Expanse 21 mm.

Male type from Ibusuki, province of Satsuma, Kyūshū, taken in August, 1895.

Allied to *N.* (*Oligochroa*) *ocelliferella*, Rag.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 1559.

360.

Nephopteryx intercisella, sp. n.

♂. Head and thorax greyish brown, abdomen fuscous grey. Forewings greyish brown, except medial area, which is whitish

grey; antemedial line black, double, slightly excurved, preceded by a castaneous patch extending from median nervure to the inner margin; a small patch of dark greyish scales below vein 2, and a castaneous lunular mark at outer end of the cell; postmedial line brownish, outwardly oblique and dentate, not clearly defined; submarginal line whitish grey, excurved beyond the cell; fringes grey, traversed at their base by a pale line and preceded by a series of black dots. Hindwings semi-hyaline, venation and fringes dark grey, the latter traversed at their base by a pale line and preceded by a diffuse blackish line. Underside of forewings dark fuscous, hindwings tinged with fuscous.

Expanse 30 mm.

Male type from Yoshino.

One male and four female specimens taken at Yoshino, Yamato, in July, 1899.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 1565.

361.

Nephopteryx (?) *mancella*, sp. n.

♂. Forewings dull brownish with a whitish, oblique fascia before the middle, traces of two blackish dots at end of the cell, and an obscure whitish submarginal line, the latter indented below the costa. Hindwings and underside fuscous. Fringes of all the wings brownish grey.

Expanse 20 mm.

Allied to *N. rhyparella*, Rag.

One male specimen (without head) from Yamato, captured in June, 1900.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 1582.

362.

Nephopteryx (*Salebria*) *morosalis.*

Nephopteryx morosalis, Saalm., Ber. Senck. Nat. Ges., 1879–80, p. 307; Rag., Mon. Phyc., p. 370, pl. xii, fig. 3 (1894); Hampson, Fauna Brit. India, Moths, iv, p. 82 (1896).

Three male specimens and one female taken at Yoshino, Yamato, in May, June and September, 1896, 1899, 1900. Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. W. and S. AFRICA; MADAGASCAR; E. SIBERIA (Amurland); N.W. HIMALAYAS; JAPAN.
Collection number, 1581.

363.

Nephopteryx (Salebria) adelphella.

Phycis adelphella, F. R., p. 50, pl. xxix, fig. 2 (1836); Rag., Mon. Phyc., i, p. 356 (1894).
Salebria adelphella, Staud., Cat. Lep. pal., ii, p. 33 (1901).

Staudinger records this species from Japan.
General distribution. EUROPE; JAPAN.

Genus EPICROCIS.

Zeller, Isis, 1848, p. 878; Hampson, Fauna Brit. India, Moths, iv, p. 85 (1896).

364.

Epicrocis hilarella.

Epicrocis hilarella, Rag., Nouv. Phycit., p. 22 (1888); Rom. sur Lép., vii, p. 438, pl. xii, fig. 7 (1893); Hampson, Fauna Brit. India, Moths, iv, p. 87 (1896); Leech, Trans. Ent. Soc. Lond., 1901, p. 409.

Four male specimens taken at Yoshino, Yamato, in May and June, 1899, 1900, 1901.
Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. CHINA; MURREE; SIMLA; CEYLON; JAPAN.
Collection number, 1583.

Genus DIORYCTRIA.

Zeller, Isis, 1846, p. 732.

365.

Dioryctria splendidella.

Nephopteryx splendidella, Herr-Schäff., iv, p. 79 (1849), and v, pl. vii, fig. 43 (1854); Rag., Ent. Month. Mag., xxiv, p. 224; *id.*, Mon. Phyc., p. 195.

Phalaena abietella, Dup., x, p. 237, pl. 181, fig. 4*b* (*nec* 4*a*), (1836).

Dioryctria splendidella, Staud., Cat. Lep. pal., ii, p. 37 (1901).

Staudinger records this species from Japan.

General distribution. EUROPE; JAPAN.

Genus RHODOPHAEA.

Guenée, Eur. Microlep., Ind. Meth., p. 74 (1845); Hampson, Fauna Brit. India, Moths, iv, p. 98 (1896).

366.

Rhodophaea rufilimbalis, sp. n.

♂. Forewings greyish clouded with darker; medial line whitish, curved, preceded by a rufous patch; submarginal line whitish, area beyond rufous. Hindwings and underside of all the wings dark fuscous.

Expanse 16 mm.

Male type from Yoshino, Yamato, June, 1900.

Local distribution. HONDO.

Habitat. JAPAN.

Collection number, 1580.

367.

Rhodophaea incertella, South, ined., sp. n.

♀. Primaries brownish grey, inclining to reddish brown between the transverse lines; subbasal line blackish, inwardly edged with white, almost straight; antemedial line blackish, inwardly edged with white, sinuous and slightly oblique, followed by a dark brown band; submarginal line pale, sinuous, very indistinct; a white linear mark at end of cell. Secondaries pale fuscous. Fringes grey, becoming almost white towards the tips. Under surface fuscous.

Expanse 21 mm.

There is one specimen of this species undescribed in the National Collection, named *incertella* by Mr. South, and I have therefore described it.

Local distribution. KYŪSHŪ.

Habitat. JAPAN.

Genus ACROBASIS.

Zeller, Isis, 1848, p. 606; Hampson, Fauna Brit. India, Moths, iv, p. 98 (1896).

368.

Acrobasis ferruginella, sp. n.

♂. Forewings ferruginous with a whitish space on the costal area and a whitish, oblique, antemedial line; submarginal line whitish suffused with ferruginous. Hindwings pale fuscous. Fringes agree in colour with the wings and have a darker line at their base. Under surface: forewings fuscous, brownish on outer area and whitish along the inner margin; hindwings pale fuscous.

Expanse, 19 mm ♂, 22 mm. ♀

Male type from Yoshino, Yamato, May, 1900.

A series of eight male specimens and one female taken at Yoshino, Yamato, in May, June, July and August, 1899, 1900, 1901. In the female specimen the markings are brighter and more conspicuous than in the males.

Seems to be most nearly allied to *A. encaustella*, Rag.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 1569.

Genus CRYPTOBLABES.

Zeller, Isis, p. 644 (1848); Hampson, Fauna Brit. India, Moths, iv. p. 104 (1896).

369.

Cryptoblabes taenialis, sp. n.

♂. Head and collar ferruginous, thorax deep fuscous mixed with ferruginous, abdomen pale fuscous grey. Forewings deep fuscous grey, ferruginous at extreme base; ante- and postmedial lines ferruginous, the former slightly angled at middle and widening on the inner margin, the latter slightly curved; the space between the lines is darker. Hindwings pale fuscous grey. Fringes grey, paler at their base and preceded by a blackish line. Underside dark fuscous, rather silky.

Expanse 17 mm.

Male type from Yoshino, Yamato, June, 1900.

Seven male and one female specimens taken at Yoshino, Yamato, in June, 1899, 1900, 1901.

Local distribution. HONDO.
Habitat. JAPAN.
Collection numbers, 1578 and 1579.

370.

Cryptoblabes loxiella.

Cryptoblabes loxiella, Rag., Ann. Soc. Ent. Fr., 1887, p. 226; Mon. Phyc., i, p. 14, pl. v, fig. 4; Staud., Cat. Lep. pal., ii, p. 42, No. 795, 1901.
Cryptoblabes rutilella, Herr-Sch., 74 (75 ?), iv, p. 101.

Staudinger records this species from Japan; unrecorded by Leech.

General distribution. EUROPE; E. SIBERIA (Ussuri); JAPAN.

Sub-family *EPIPASCHIANAE.*

Genus MACALLA.

Walker, xvi, p. 155 (1858); Hampson, Fauna Brit. India, Moths, iv, p. 112 (1896).

371.

Macalla bilineata, sp. n.

♂. Forewings brown with a reddish tinge, powdered and clouded with darker, especially on the outer marginal area; two black transverse lines, the first slightly oblique, the second excurved beyond the cell and outwardly edged by a serrated pale line; a thin blackish marginal line with black dots on it. Hindwings and underside fuscous, becoming darker on the outer margins. Fringes greyish, darker towards their base.

Expanse 24 mm.

Allied to *M. inimica*, Butl.
Male type from Shioya, province of Settsu, July, 1901.
Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 1476.

372.

Macalla elegans.

Macalla elegans, Butler, Trans. Ent. Soc. Lond., 1881, p. 581; Staud., Lep. Cat. pal., ii, p. 258 (1901).

A series of three male and ten female specimens taken at Yoshino, Yamato, in June, July and August, 1899, 1900, and at Nikko in August, 1893.
Expanse, 30 mm. ♂, 35 mm. ♀.

This species is described by Butler from Japan, but was omitted from Leech's "Catalogue of *Heterocera* from China, Corea and Japan." Staudinger includes it in his Catalogue.

Local distribution. Hondo.
General distribution. E. Siberia; Japan.
Collection number, 1475.

373.

Macalla scoparialis, sp. n.

♂. Head and thorax pale grey, the latter with a faint olive tinge. Forewings brownish on basal and outer marginal areas, the median area pale grey with a faint olive tinge and a brownish discal cloud; antemedial line black, almost straight, not clearly defined towards the costa; postmedial line black, sinuous, with a strong outward projection about the middle, two black dots at the outer end of the cell and a series of black points on the outer margin; fringes grey, mixed with brownish, preceded by a pale line. Hindwings whitish, suffused with fuscous, broadly bordered with dark fuscous; fringes grey, preceded by a whitish line. Under surface whitish, all the wings have a dusky discal mark, dark fuscous postmedial line and outer marginal border.

Expanse 30 mm.

Male type from Nikko, August, 1893.

Local distribution. Hondo.
Habitat. Japan.
Collection number, 1280.

Genus Stericta.

Lederer, Wien. ent. Mon., vii, p. 340 (1863); Hampson, Fauna Brit. India, Moths, iv, p. 120 (1896).

374.

Stericta olivalis, sp. n. (Plate XXXI. fig. 20.)

♂. Forewings pale olive green, powdered with black, and clouded with brownish on the outer area; a black dot on the costa near the base, two black dots at outer extremity of the cell, and one below the cell preceded by a short black dash; traces of black antemedial represented by a black dot on the costa; postmedial line pale olive, inwardly edged with black, curved beyond the cell; a series of black dots on the outer margin; fringes brownish, mixed with paler. Hindwings pale fuscous, outer half darker and traversed by an irregular line of the ground-colour; fringes pale brown, chequered

with darker. Underside pale brownish; forewings clouded with dark fuscous on costal and outer marginal areas; some black dots on the costa, a black dot at end of the cell and traces of a blackish postmedial line; hindwings have a black discal dot and a black transverse line, the latter serrated and curved.

Expanse 31 mm.

Male type from Yoshino, Yamato, August, 1900.

Local distribution. HONDO.

General distribution. SIKHIM; JAPAN.

In the National Collection at South Kensington there are four specimens from Sikhim in the series of *S. divitalis*, Guen., that seem to belong to this species.

Collection number, 1473.

Genus ORTHAGA.

Walker, Cat. Lep. Het., xvi, p. 191 (1858); Hampson, Fauna Brit. India, Moths, iv, p. 124 (1896).

375.

Orthaga griscalis, sp. n.

♂. Pale grey variegated with darker grey and brownish. Forewings, transverse lines obscure, the basal area within the antemedial line suffused with brownish; submarginal line of the ground colour, the space between it and the postmedial line suffused with brownish, as also is the area beyond the submarginal line; a small tuft of black scales at outer end of the cell, and a similar tuft below it, the latter followed by a blackish streak extending to the submarginal line; fringes preceded by a series of black lunules. Hindwings fuscous. Under surface fuscous, rather glossy; the forewings have a dusky submarginal line, and the hindwings have a dusky postmedial line.

Expanse 20 mm.

Male type from Yokohama, October, 1897.

Three male specimens and one female. One specimen unlocalised, the others taken at Yoshino, Yamato, and Yokohama, in July and October, 1897, 1898, 1899.

This species belongs to the *Pannucha* section of *Orthaga*, in which the male has a glandular lobe on costa of the forewings.

Local distribution. HONDO.

Habitat. JAPAN.

Collection number, 1483.

376.

Orthaga euadrusalis.

Orthaga euadrusalis, Walk., Cat. Lep. Het., xvi, p. 191; Moore, Lep. Ceyl., iii, pl. clxxviii, figs. 2, 2*a*; Hampson, Fauna Brit. India, Moths, iv., p. 125.
Orthaga acontialis, Walk., Cat. Lep. Het., xxvii, p. 103.

Six male and four female specimens taken at Yoshino, Yamato, in June, July, August and September, 1899, and at Kumayama, Iyo, in August, 1896.
Expanse, 28 mm. ♂, 32 mm. ♀
Hitherto unrecorded from Japan.

Local distribution. Hondo; Shikoku.
General distribution. Sikhim; Ceylon; Borneo; Java; Japan.
Collection number, 1478.

Sub-family *ENDOTRICHINAE.*

Genus Endotricha.

Zeller, Isis, 1847, p. 593; Hampson, Fauna Brit. India, Moths, iv., p. 132 (1896).

377.

Endotricha icelusalis.

Pyralis icelusalis, Walk., Cat. Lep. Het., xix, p. 900 (1859).
Rhodaria flavofascialis, Brem., Ost.-Sib., p. 65, pl. vi, fig. 1 (1864).
Pyralis roscalis, Walk., Cat. Lep. Het., xxxiv, p. 1236 (1865).
Endotricha icelusalis, Leech, Trans. Ent. Soc. Lond., 1901, p. 419.

A series of nine male and six female specimens taken in the following localities: Yoshino, Yamato, May, June, July and September, 1895, 1899, 1900; Hayakusa and Iida-San, Higo, in May and June, 1895; Takanabe and Miyazaki, Hyūga, September, 1895; Yokohama, July, 1898; Higashi-no-Kawa, Iyo, July, 1896; Hakodate, Yezo, July, 1902.
Recorded by Staudinger from Japan, unrecorded by Leech.

Local distribution. Hondo; Kyūshū; Shikoku; Yezo.

General distribution. Eastern and Central China; Corea; Amurland; Japan.

Collection number, 1487.

378.

Endotricha theonalis.

Pyralis theonalis, Walk., Cat. Lep. Het., xix, p. 900 (1859) (♂).

Pyralis (?) *thermusalis*, Walk., *l. c.*, p. 912 (♀).

Zania unicalis, Walk., Cat. Lep. Het., xxxiv, p. 1257 (1865).

Endotricha theonalis, Leech, Trans. Ent. Soc. Lond., 1901, p. 417.

All the types of above were from Shanghai.

Three male specimens (*theonalis*) taken at Miyazaki, Hyūga, in September, 1895; at Kagoshima and Kiire, Satsuma, in July, 1895.

Four female specimens (*thermusalis*) taken at Takanabe, Hyūga, in September and October, 1895, and at Junsai Numa, Oshima, in July, 1896.

Hitherto unrecorded from Japan.

Local distribution. Kyūshū; Yezo.

General distribution. Eastern China; Formosa; Japan.

Collection numbers, 1489 and 1491.

379.

Endotricha albicilia.

Endotricha albicilia, Hampson, Ill. Het. B. M., viii, p. 130, pl. cliv, fig. 22: *id.*, Fauna Brit. India, Moths, iv, p. 133 (1896).

One male specimen taken at Yokohama, July, 1898.

Hitherto unrecorded from Japan.

Local distribution. Hondo.

General distribution. Sikhim; Nilgiris; Ceylon; Japan.

Collection number, 1493.

Sub-family *PYRALINAE.*

Genus PYRALIS.

Linn., Syst. Nat., xii, p. 881 (1767); Hampson, Fauna Brit. India, Moths, iv, p. 149 (1896).

380.

Pyralis nanalis, sp. n.

♂. Reddish purple. Forewings have the costa finely edged with black and marked with whitish, and a black dot at outer extremity of the cell; postmedial line blackish outwardly edged with ochreous, angled below costa and terminating near the outer angle. Hindwings have traces of a blackish medial line which is curved and sinuous. Underside similar to the upperside, but the hindwings are paler.

Expanse 16 mm.

Male type from Yoshino, Yamato, July, 1899.

One male and two female specimens taken at Kōbe and Shioya, Settsu and Yoshino, Yamato, in May, June and July, 1899, 1901.

Local distribution.. HONDO.
Habitat. JAPAN.
Collection number, 1506.

Genus HERCULIA.

Walker, Cat. Lep. Het., xix, p. 807 (1859); Hampson, Fauna Brit. India, Moths, iv, p. 159 (1896).

381.

Herculia umbrosalis, sp. n.

♂. Forewings purplish brown, sparingly dusted with black atoms a black dot at end of the cell; ante- and postmedial lines black, each originating in a yellowish spot on the costa, the postmedial only well defined, and this is outwardly edged with yellowish. Hindwings less purple than the forewings, postmedial line blackish and edged with yellowish towards the inner margin. Fringes purplish, tipped with dark grey and preceded by a black line. Underside purplish suffused with black, all the wings have a black discal dot, and a black postmedial line, the latter outwardly edged with yellow.

Expanse 22 mm.

Male type from Tōkyo, taken in May, 1895.
Near *H. igniflualis*, Walk.

Local distribution. Hondo.
Habitat. Japan.
Collection number, 1509*a*.

Genus Orybina.

Orbya, Walker, Cat. Lep. Het., xxvii, p. 10 (1863) (praeoc).
Orybina, Snellen, Tidj. Ent., 1894, p. 5.

382.

Orybina regalis.

Oryba regalis, Leech, Entom., xxii, p. 71, pl. iv, fig. 9 (1889); Trans. Ent. Soc. Lond., 1901, p. 432.

A series of eight male and four female specimens taken at Yoshino, Yamato, in June, July and August, 1899, 1900, 1901. The series is uniform in colour and markings.
Hitherto unrecorded from Japan.

Local distribution. Hondo.
General distribution. Corea; Central China; Japan.
Collection number, 1525.

Sub-family *HYDROCAMPINAE.*

Genus Nymphula.

Schranck, Fauna Boica, ii, pt. 2, p. 162 (1802); Hampson, Fauna Brit. India, Moths, iv, p. 191 (1896).

383.

Nymphula interruptalis.

Hydrocampa interruptalis, Pryer, Cist. Ent., ii, p. 233, pl. iv, fig. 5 (1887); Leech, Trans. Ent. Soc. Lond., 1901, p. 432.
Hydrocampa nigrolinealis, Pryer, *l. c.*, fig. 6.
Hydrocampa interruptalis, var. *separatalis*, Leech, Entom., xxii, p. 71, pl. iv, figs. 2, 13 (1889).

I have one female specimen of the *nigrolinealis*= *separatalis* form taken at Komatsu, Iyo, June, 1896. Leech recorded this variety from Corea and China, but does not

mention it from Japan. Of the typical form which has already been recorded by Leech from Japan, I have taken two male and nine female specimens in the following localities: Yoshino, Yamato, June and July, 1899, 1900; Tōkyo, March and April, 1893; Suma, near Kōbe, July and August, 1901; Junsai Numa, Oshima, July, 1902.

Local distribution. HONDO; YEZO.
General distribution. CHINA; ASSURI; COREA; JAPAN.
Collection number, 1530.

384.

Nymphula vittalis.

Oligostigma vittalis, Brem., Lep. Ost.-Sib., p. 66, pl. vi, fig. 3 (1864).
Oligostigma regularis, Pryer, Cist. Ent., ii, p. 234, pl. iv, fig. 8 (1877).
Nymphula vittalis, Leech, Trans, Ent. Soc. Lond., 1901, p. 432; Staud., Cat. Lep. pal., ii, p. 49.

Three male and three female specimens taken at Imajo, Higo, in May, 1895.

Local distribution. KYŪSHŪ.
General distribution. AMURLAND; EASTERN and CENTRAL CHINA; COREA; JAPAN.
Recorded by Staudinger from Japan, but not by Leech.
Collection number, 1532.

385.

Nymphula fluctuosalis.

Nymphula fluctuosalis, Zell., K. Vet.—Ak., Handl., 1852, p. 27.
Paraponyx linealis, Guen., Delt. et. Pyr., p. 271.
Oligostigma chrysippusalis, Walk., Cat. Lep. Het., xvii, p. 432.
Oligostigma obitalis, Walk., *l. c.*
Paraponyx aptalis, Led. Wien., ent. Mon., 1863, pp. 452, 485.
Oligostigma curta, Butl., Ent. Mo. Mag., xv, p. 270.
? *Paraponyx oryzalis*, Wood-Mason, Rice pest of Burma, Calcutta, 1885.
Nymphula fluctuosalis, Hampson, Fauna Brit. India, Moths, iv, pp. 193, 194, fig. 115.

One male and five female specimens taken at Miyazaki and Kiyotaki, Hyūga, in September, 1895, and at Kiire, Satsuma, in July, 1895.

Hitherto unrecorded from Japan.

Local distribution. KYŪSHŪ.

General distribution. Throughout the tropical and subtropical zones, on the north to Formosa, Japan and the Sandwich Islands, on the south to Australia.

Collection number, 1533.

386.

Nymphula foedalis.

Isopteryx foedalis, Guen., Delt. et Pyral., p. 228, pl. iv, fig. 7 (1854).

Nymphula foedalis, Hampson, Fauna Brit. India, Moths, iv, p. 192 (1896); Leech, Trans. Ent. Soc. Lond., 1901, p. 433.

Three male specimens taken at Takanabe and Miyazaki, Hyūga, in September and October, 1903.

Hitherto unrecorded from Japan.

Local distribution. KYŪSHŪ.

General distribution. ETHIOPIAN, ORIENTAL and AUSTRALIAN REGIONS; EASTERN CHINA; JAPAN.

Collection number, 1543.

387.

Nymphula stagnata.

Nymphula stagnata, Don., Nat. Hist., xi, pl. cccIxiii, fig. 3 (1806).

Two male specimens received from Mr. Andrews, Hakodate.

Hitherto unrecorded from Japan.

Local distribution. YEZO.

General distribution. EUROPE; ASIA MINOR; ARMENIA; E. SIBERIA (Amur.); JAPAN.

Collection number, 1545.

Genus AULACODES.

Guenée, Delt. et Pyr., p. 258 (1854); Hampson, Fauna Brit. India, Moths, iv, p. 212 (1896).

388.

Aulacodes nawalis, sp. n.

♀. Forewings pale ochreous brown; a short outwardly oblique antemedial band from inner margin to the cell, a somewhat triangular spot at end of the cell, a broad postmedial band, and a narrow submarginal line; all these markings are silvery white edged with dark brown, the postmedial band is contracted above the middle. Hindwings have the basal three-fourths silvery white, traversed by a broad dark brown line, and limited by a dark brown line running parallel with the outer margin; a broad silvery white line from the anal angle to vein 3, and four black dots inwardly edged with white beyond. Underside similar to the upperside but paler.

Expanse 20 mm.

Female type received from Mr. Nawa, Gifu.
Seems to be most nearly allied to *A. laminalis*, Hampson.
The type is minus the head.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 1535.

Genus PARTHENODES.

Guenée, Delt. et Pyr., p. 252 (1854); Hampson, Fauna Brit. India, Moths, iv, p. 216 (1896).

389.

Parthenodes bifurcalis, sp. n. (Plate XXXI, fig. 23.)

♂. Pale brown with white and dark brown markings. Forewings have the basal area marked with white; antemedial line dark brown, bifurcate below the cell, enclosing a triangular white spot on the inner margin, the costal extremity of the line is inwardly edged with white; beyond the middle of the costa there is a large white spot on which is placed a dark U-shaped mark; submarginal line white, outer margin golden brown. Hindwings have the basal two-thirds white; subbasal, ante- and postmedial lines dark brown, the last outwardly edged with golden brown; submarginal line and outer margin as on forewings. Underside similar to the upperside but the ground-colour is much paler.

Expanse 18 mm.

Male type from Komatsu, Iyo, August, 1896.

A series of three male and seven female specimens taken in August, 1896, at Ōhoki, Himi, Komatsu, Ochiai, Ofuki and Kumayama, all in the province of Iyo, Shikoku; also at Ōmine-San, Yamato, July, 1894.

Expanse of series, 18 mm. ♂, to 20 mm. ♀.

An example of this species from Japan was recently sent to the British Museum for identification by the Washington Museum.

Allied to *P. prodigalis*, Leech.

Local distribution. SHIKOKU; HONDO.
Habitat. JAPAN.
Collection number, 1531.

390.

Parthenodes sutschana.

Parthenodes sutschana, Hampson, Trans. Ent. Soc. Lond., 1900, p. 384; Leech, Trans. Ent. Soc. Lond., 1901, p. 438.

One male and eight female specimens taken at Yoshino, Yamato, August and September, 1899; at Kagoshima, Satsuma, July, 1899; at Suma, near Kōbe, Settsu, July, 1901.

Hitherto unrecorded from Japan.

Local distribution. HONDO; KYŪSHŪ.
General distribution. COREA; CENTRAL CHINA; JAPAN.
Collection number, 1534.

Sub-family *PYRAUSTINAE.*

Genus AGROTERA.

Schrank, Fauna Boica, ii. pt. 2, p. 163 (1798); Hampson, Fauna Brit. India, Moths, iv, p. 266 (1896).

391.

Agrotera posticalis, sp. n.

♂. Head and thorax pale ochreous, the latter marked with orange. Forewings purplish brown, basal third pale ochreous marked with orange and limited by the black, curved, antemedial line; postmedial line black, slightly sinuous, bent inwards under vein 2; a blackish dot in the cell and a blackish lunule at outer end of the cell, there are traces of a subbasal line on the

costa; fringes of the ground-colour marked with whitish below apex and before the outer angle. Hindwings purplish brown, pale ochreous at the base; a black discal dot and a blackish postmedial line, the latter bent inwards below vein 2; fringes marked with whitish towards anal angle. Underside fuscous with a faint purplish tinge, fringes marked as above.

Expanse 18 mm. Expanse of series, 15 mm. ♂, to 18 mm. ♀.

Male type from Ōhoki, province of Iyo, June, 1896.

Four male and four female specimens taken at Yoshino, Yamato, July and August, 1899; at Yokohama, May, 1898; at Shioya, near Kōbe, July, 1901; and at Miyazaki, Hyūga, September, 1895.

Local distribution. Hondo; Kyūshū; May to September.

Habitat. Japan.

Collection number, 1736.

Genus Pagyda.

Walker, Cat. Lep. Het., xvii, p. 487 (1859); Hampson, Fauna Brit. India, Moths, iv, p. 270 (1896).

392.

Pagyda ochrealis, sp. n. (Plate XXX, fig. 17.)

♂. Bright ochreous. Forewings have three brown lines, antemedial and medial straight, the latter not reaching the costa, postmedial inwardly oblique from the costa to vein 3 where it terminates; there are faint traces of a brownish submarginal line parallel with the outer margin. Hindwings have two oblique brown lines, the first rather obscure, and a brownish shade parallel with the outer margin. Fringes of the ground-colour but paler towards the tips and preceded by a brown line. Under surface fuscous tinged with cinnamon brown, markings of upperside faintly reproduced.

Expanse 24 mm.

Male type from Junsai Numa.

One male taken at Junsai Numa, in July, 1902, and one female specimen at Yokohama, July, 1897.

Local distribution. Yezo; Hondo.

Habitat. Japan.

Collection number, 1610.

Genus Marasmia.

Lederer, Wien. ent. Mon., 1863, p. 385; Hampson, Fauna Brit. India, Moths, iv, p. 275 (1896).

393.

Marasmia venilialis.

Marasmia venilialis, Walk., Cat. Lep. Het., xvii, p. 373 (1859).
Botys ruralis, Walk., Cat. Lep. Het., xviii, p. 666.
Botys marisalis, Walk., Cat. Lep. Het., xviii, p. 717.
Marasmia cicatricosa, Led., Wien. ent. Mon., 1863, p. 386, pl. xii, fig. 8.
Lasiacme mimica, Warr., Ann. and Mag. Nat. Hist. (6), xviii, p. 177.
Marasmia venilialis, Hampson, Fauna Brit. India, Moths, iv, p. 276.

Two male specimens taken at Ibusuki, Satsuma, and Sakurajima, Ōsumi, in July, 1895. These are referable to the *marisalis* form.

Hitherto unrecorded from Japan.

Local distribution. Kyūshū.

General distribution. W. and S. Africa; throughout India, Ceylon and Burma; Borneo; Australia; Solomon Islands; Fiji; Japan.

Collection numbers, 1728 and 1731.

394.

Marismia limbalis, sp. n.

♂. Forewings purplish brown suffused with greyish; ante- and postmedial lines darker, the former slightly curved towards the costa and broadly bordered inwardly with pale brownish, the latter turned inward to lower angle of the cell, thence direct to the inner margin, bordered outwardly with pale brownish. Hindwings have the basal two-thirds pale brownish, outer third purplish brown suffused with greyish; two darker transverse lines, the first from discal lunule to anal angle and the second united with the purplish brown border at the costa and below the middle. Underside shining fuscous with traces of the transverse lines.

Expanse 16 mm.

Male type from Yoshino, Yamato, June, 1895.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 1504.

Genus SYNGAMIA.

Guenée, Delt. et Pyr., p. 187 (1854); Hampson, Fauna Brit. India, Moths, iv, p. 279 (1896).

395.

Syngamia brevifascialis, sp. n.

♂. Pale purplish brown. Forewings have a white fascia extending from costa to vein 3 and traces of an undulated line thence to inner margin, an obscure whitish dot on the costa beyond the fascia. Hindwings have a medial spot and an undulated line from it to the inner margin. Underside similar to the upper.

Expanse 18 mm.

Male type without head and otherwise in poor condition, from Kosadake, Higo, June, 1895.

Seems to be allied to *S. falsidicalis*, Walk.

Local distribution. KYŪSHŪ.
Habitat. JAPAN.
Collection number, 1551.

Genus PHRYGANODES.

Guenée, Delt. et Pyr., p. 353 (1854); Hampson, Fauna Brit. India, Moths, iv, p. 300 (1896).

396.

Phryganodes munitalis, sp. n. (Plate XXX, fig. 15.)

♀. Purplish brown, wings with ochreous markings. Forewings have a curved ochreous band extending from about middle of the costa to vein 2; there is a small spot of the same colour below extremity of the band and another below the costa at one-third from the base; from the latter point the costa is streaked with ochreous almost to the apex but is interrupted by the ground-colour just beyond the band; fringes ochreous. Hindwings have an ochreous medial band which is slightly contracted before the middle and is abruptly narrowed towards the abdominal margin; fringes

ochreous. Underside similar to the upper but the colours are duller.

Expanse 29 mm.

Female type from Shiokubi, Oshima, July, 1902.
Closely allied to *P. glyphodalis*, Walk.

Local distribution. Yezo.
Habitat. Japan.
Collection number, 1662*a*.

Genus Nacoleia.

Walker, Cat. Lep. Het., xix, p. 934 (1859); Hampson, Fauna Brit. India, Moths, iv, p. 312 (1896).

397.

Nacoleia pallidinotalis, sp. n.

Nacoleia pallidinotalis, Hampson, ined.

Three specimens in the National Collection, South Kensington, the description of which has not yet been published.

Male type from W. China.

Local distribution. Yezo, Hakodate (*Leech*); Kyūshū, province of Satsuma (*Leech*).

General distribution. Corea; Central and Western China; Japan.

398.

Nacoleia catenalis, sp. n.

♂. Forewings pale ochreous brown, outer margin bordered with fuscous; antemedial line black, angled below the cell; postmedial line black, wavy, turned in under vein 3 and angled before reaching the inner margin; a black annulus in the cell and an incomplete one at outer extremity of the cell, two curved black lines and a dot on the costa before postmedial line. Hindwings pale fuscous, a black dot in the cell and an annulus at end of the cell; postmedial line black, indented opposite the cell and turned inwards for a short distance along vein 2. Fringes whitish brown traversed by a darker line and preceded by a black line. Underside similar to the upperside.

Expanse 20 mm.

Male type from Tarumidzu, Ōsumi, September, 1895.

Local distribution. KYŪSHŪ.
Habitat. JAPAN.
Collection number, 1725.

399.

Nacoleia maculalis.

Nacoleia maculalis, South, Trans. Ent. Soc. Lond., 1901, p. 462, pl. xiv, fig. 7.

One male specimen taken at Dorokawa, Yamato, in June, 1895. This specimen is in bad condition and is minus the right fore- and hindwings.

Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. CENTRAL and WESTERN CHINA; JAPAN.
Collection number, 1503.

400.

Nacoleia lophophoralis, sp. n.

Nacoleia lophophoralis, Hampson, ined.

Two specimens in the National Collection, South Kensington.

Local distribution. HONDO, Fushiki (*Leech*), type ♂.
General distribution. SINGAPORE; JAPAN.

401.

Nacoleia cyanealis.

Nicolcia cyanealis, Walk., Cat. Lep. Het., xvii, p. 405.
Metasia zanclogramma, Meyer, Trans. Ent. Soc. Lond., 1894, p. 8.
Nacoleia cyanealis, Hampson, Fauna Brit. India, Moths, iv, p. 321 (1896).

Recorded by Hampson from Japan. Unrecorded by Leech.

General distribution. INDIA (Kulu, Nilgiris); CEYLON; SHAN STATES; BORNEO; MALAY PENINSULA; JAPAN.

Genus Sylepta.

Hübner, Verz. p. 356 (1872); Hampson, Fauna Brit. India, iv, p. 328 (1896).

402.

Sylepta ovialis.

Sylepta ovialis, Walk., Cat. Lep. Het., xviii, p. 636; Hampson, Fauna Brit. India, Moths, iv, p. 340 (1896).

One male specimen taken at Nikko, July, 1894. Hitherto unrecorded from Japan.

Local distribution. Hondo.

General distribution. W. Africa; Abyssinia; Sikhim; Khásis; Japan.

Collection number, 1634.

Genus Ceratarcha.

Swinhoe, Ann. and Mag. Nat. Hist. (6), xiv, p. 200 (1894); Hampson, Fauna Brit. India, Moths, iv, p. 324 (1896).

403.

Ceratarcha umbrosa.

Ceratarcha umbrosa, Swinh., Ann. and Mag. Nat. Hist. (6), xiv. p. 200 (1894); Hampson, Fauna Brit. India, Moths, iv. p. 325 (1896).

One female specimen from Takanabe, province of Hyūga, September, 1895.

Hitherto unrecorded from Japan.

Local distribution. Kyūshū.

General distribution. India (Sikhim, Khásis, Nagas); Japan.

Collection number, 1400.

Genus Lygropia.

Lederer, Wien. ent. Mon., p. 381, 1863; Hampson, Fauna Brit. India, Moths, iv, p. 341 (1896).

404.

Lygropia curyclealis.

Botys curyclealis, Walk., Cat. Lep. Het., xviii, p. 651 (1859).

Lygropia eurycealis, Hampson, Fauna Brit. India, Moths, iv, p. 343 (1896); Leech, Trans. Ent. Soc. Lond. (1901), p. 471.

A series of five male and four female specimens taken at Yoshino, Yamato, June and August, 1895; Kiire, Satsuma, August, 1895; Sakura-jima, Ōsumi, July, 1895; Fune-no-Yama, Higo, June, 1893; Takanabe, Hyūga, October, 1895.

Leech (*supra*) records one specimen of this species from Ichang, in China, but does not record the capture of any specimens in Japan. In summing up the distribution of the species, however, he omits to mention China as a locality but gives Kyūshū, one of the Japanese islands. As he seems to have received only one specimen which came from Ichang his mention of Kyūshū as a locality would appear to be a mistake. There is no specimen from Japan in the National Collection in which Leech's collection has been incorporated, but there is one specimen from Ichang, China.

Local distribution. Hondo; Kyūshū.

General distribution. W. Africa, R. Niger (one specimen, B. M.); S. India; Sikhim; Moulmein; Flores; Bali; China (Ichang); Japan.

Collection number, 1592.

Genus Glyphodes.

Guenée, Delt. et Pyr., p. 292 (1854); Hampson, Fauna Brit. India, Moths, iv, p. 345 (1896).

405.

Glyphodes albilunalis, sp. n. (Plate XXXI, fig. 12.)

♂. Forewings pale greyish brown, basal area white, traversed by three dusky, transverse lines, limited by the dusky antemedial line; postmedial line white, slightly curved, preceded by a white band which extends from the costa to vein 2, the lower end is slightly tapered and the outer edge is indented above the middle; a white curved mark on vein 2 between the end of band and the antemedial line. Hindwings pale greyish brown with two white bands, the first interrupted at vein 2, and the second terminating at vein 3; postmedial line white. Fringes whitish marked with greyish brown.

Underside similar to above, but the ground-colour is paler and the markings suffused.

Expanse 26 mm.

Most nearly allied to *G. pryeri*, Butl.

Male type from Yoshino, Yamato, June, 1895.

Another male and one female taken at Mifune and Iida-San, Higo, in May and June, 1895.

Local distribution. KYSŪHŪ; HONDO.

Habitat. JAPAN.

Collection number, 1687.

406.

Glyphodes glauculalis.

Glyphodes glauculalis, Guen., Delt. et Pyr., p. 306; Moore, Lep. Ceyl., iii, pl. clxxxi, figs. 2, 2*a*; Hampson, Fauna Brit. India, Moths, iv, p. 350.

Margaronia marthesiusalis, Walk., Cat. Lep. Het., xviii, p. 531.

Margarodes nereis, Meyr., Trans. Ent. Soc. Lond., 1887, p. 271.

One male and one female specimen of the typical form taken at Yoshino, Yamato, in August, 1900.

Hitherto unrecorded from Japan.

Local distribution. HONDO.

General distribution. SIKHIM; ASSAM; CALCUTTA; BOMBAY PRESIDENCY; TRAVANCORE; CEYLON; BURMA; SUMATRA; BORNEO; JAVA; TERNATE; JAPAN.

Collection number, 1682.

407.

Glyphodes albifuscalis.

Glyphodes albifuscalis, Hampson, Proc. Zool. Soc. Lond., 1898, p. 739, pl. l, fig. 12.

Five male and five female specimens taken at Kiire, Satsuma, in July, 1895; at Yoshino, Yamato, in August, 1899, and at Nikko, in August, 1893.

Hitherto unrecorded from Japan.

Local distribution. KYŪSHŪ.

General distribution. CENTRAL and WESTERN CHINA; TIBET; JAPAN.

Collection number, 1683.

Genus Polythlipta.

Lederer, Wien. ent. Mon., vii, p. 389 (1863); Hampson Fauna Brit. India, Moths, iv, p. 364 (1896).

408.

Polythlipta liquidalis.

Polythlipta liquidalis, Leech, Entom., xxii, p. 70, pl. iii, fig. 8 (1889); Trans. Ent. Soc. Lond., 1901, p. 475.

Four male and five female specimens taken in the following localities: Kimbō-San, Kosadake, Karimata, Azami-Yama and Matsuo in Higo province; Kagoshima, Satsuma; Iyamura; Iyo; Yoshino, Yamato; in May, June, July, August and October, 1893, 1895 and 1900.

Hitherto unrecorded from Japan.

Local distribution. Kyūshū; Shikoku; Hondo.

General distribution. Central and Western China; Corea; Japan.

Collection number, 1676.

Genus Thliptoceras.

Swinhoe, Trans. Ent. Soc. Lond., 1890, p. 274; Hampson, Fauna Brit. India, Moths, iv, p. 377 (1896).

409.

Thliptoceras octoguttale.

Thliptoceras octoguttale, Feld., Reis. Nov., pl. cxxxv, fig. 38; Hampson, Fauna Brit. India, Moths, iv, p. 378 (1896).

Pyralis smaragdina, Butl., Ann. and Mag. Nat. Hist. (4), xvi, p. 411.

Two male specimens taken at Yoshino, Yamato, in August, 1899, and at Chiran, Satsuma, in August, 1895.

Hitherto unrecorded from Japan.

Local distribution. Hondo; Kyūshū.

General distribution. Natal; Sikhim; Sibságar; Nilgiris; Ceylon; Borneo; Amboyna; Australia; Japan.

Collection number, 1668.

Genus Circobotys.

Butler, Ill. Het. B. M., iii, p. 77 (1879).

410.

Circobotys gensanalis.

Crocidophora (?) *gensanalis*, South, Trans. Ent. Soc. Lond., 1901, p. 481, pl. xv, fig. 9.

Three male specimens and one female taken at Yoshino, Yamato, in June and August, 1899, 1900.

Hitherto unrecorded from Japan.

Local distribution. Hondo.
General distribution. Corea; Japan.
Collection number, 1624.

411.

Circobotys aurimargo.

Circobotys aurimargo, Warren, Ann. and Mag. Nat. Hist. (6), xviii, p. 109 (1896); Leech, Trans. Ent. Soc. Lond., 1901, p. 480.

Five male specimens and one female taken at Yoshino, Yamato, in June, 1895, 1899, 1900; Tōkyo in May, 1894; Kimbō-San, Higo, in May, 1893.

Hitherto unrecorded from Japan.

Local distribution. Hondo; Kyūshū.
General distribution. Assam; E. China; Japan.
Collection number, 1669.

Genus Phlyctaenodes.

Guenée, Delt. et Pyr., p. 173 (1854); Hampson, Fauna Brit. India, Moths, iv, p. 407 (1896).

412.

Phlyctaenodes ochrealis, sp. n.

♂. Pale ochreous, the wings with darker markings. Forewings have a slightly sinuous antemedial line, a dot in the cell and a lunule at end of the cell; postmedial line outwardly oblique from the costa, curved beyond the cell, bent inwards for a short distance along vein 2, thence direct to inner margin; the costa from base to the antemedial line agrees in colour with the transverse lines.

Hindwings have a postmedial line similar to that on the forewings. Underside pale stramineous, the forewings have a pale purplish brown discal mark, and the outer margin has a tapered border of the same colour; there are traces of a dusky postmedial line on all the wings.

Expanse 32 mm.

Male type from Yoshino, Yamato, August, 1899.

Seems to be allied to *P. crocalis*, Hampson.

One male and five females taken at Yoshino, Yamato, in August and September, 1899.

Local distribution. Hondo.

Habitat. Japan.

Collection number, 1651.

413.

Phlyctaenodes stictitalis.

Phlyctaenodes stictitalis, Linn., Syst. Nat., 1, 2, p. 883; Dup. Lép. Fr., viii, pl. ccxv, fig. 5; Hampson, Fauna Brit. India, Moths, iv, p. 407.

Seven male and four female specimens taken at Ishikawa and Tōbetsu, Oshima, in June and July, 1901, 1902.

Hitherto unrecorded from Japan.

Local distribution. Yezo.

General distribution. North America; Europe; Asia Minor; Armenia; Baluchistan; East Thian Shan; Corea; East Siberia (Amurland); Japan.

Collection number, 1714.

Genus Evergestis.

Hübn., Verz., p. 354 (1827).

414.

Evergestis extimalis.

Pyralis extimalis, Scop., Ent. Carn., No. 614 (1763).

Pyralis margaritalis, Schiff., Wien, Verz., p. 123.

Pyralis erucalis, Hübn., Pyral., fig. 55.

Evergestis consimilis, Warren, Ann. and Mag. Nat. Hist. (6), ix, p. 433 (1892).

Evergestis extimalis, Hampson, Proc. Zool. Soc. Lond., 1899, p. 186; Leech, Trans. Ent. Soc. Lond., 1901, p. 478.

A series of seven males and four females taken at Junsai Numa in July, 1902, and at Obirashibe, Teshio, in June, 1899; six specimens received from Mr. Andrews, Hakodate.

Hitherto unrecorded from Japan.

Local distribution. Yezo.

General distribution. Europe; Corea; Western China; East Siberia (Amurland); North America; Japan.

Collection number, 1674.

Genus Mecyna.

Guenée, Delt. et Pyr., p. 406 (1854); Hampson, Fauna Brit. India, Moths, iv, p. 417 (1896).

415.

Mecyna prunipennis.

Mecyna prunipennis, Butler, Ann. and Mag. Nat. Hist. (5), iv, p. 454 (1879).

One male and five female specimens taken at Yoshino, Yamato, in May, July, August and September, 1899, 1900, 1901.

Butler described the type of this species from Yokohama, but it is not included by Leech in his catalogue, and it is the only specimen in the National Collection.

Local distribution. Hondo.

General distribution. Japan.

Collection number, 1643.

Genus Metasia.

Guenée, Delt. et Pyr., p. 251 (1854); Hampson, Fauna Brit. India, Moths, iv, p. 420 (1896).

416.

Metasia coniotalis.

Metasia coniotalis, Hampson, Journ. Bomb. N. H. Soc., xv, p. 220 (1904).

Three male specimens and one female taken at Yoshino, Yamato, in July and August, 1895, 1899.

Hitherto unrecorded from Japan.

Local distribution. Hondo; Kyūshū (Nasasaki).
General distribution. N. China; C. China; Tibet; Kashmir; Simla.
Collection numbers, 1502, 1541 and 1542, Japan.

Genus Pionea.

Guenée, Delt. et Pyr., p. 367 (1854); Hampson, Fauna Brit. India, Moths, p. 422 (1896).

417.

Pionea stigmatalis, sp. n.

♂. Forewings greyish freckled with darker, the outer marginal area, limited by a serrated blackish line, dark grey, almost blackish; the stigmata, especially the outlines, are darker than the ground colour; there are two black dots on the costa just before the submarginal line, another on the line and two others between the line and the apex of the wing; fringes dark grey preceded by an interrupted black line. Hindwings whitish, the outer margin bordered with dark grey; submarginal line dark grey, obscure towards the inner margin. Underside similar to above, but the dark marginal borders are absent, and the hindwings have a black, discal lunule and a dot at lower angle of the cell.
Expanse 27 mm.

Allied to *P. prunalis*, Schiff.
Male type from Yoshino, Yamato, October, 1899. In poor condition.

Local distribution. Hondo.
Habitat. Japan.
Collection number, 1496.

418.

Pionea (?) *plagialis*, sp. n. (Plate XXXI, fig. 10.)

♂. Whitish, semihyaline, with brownish transverse lines. The forewings have a brownish patch on the middle of the inner margin, a brownish round spot in the cell, and two linear marks at outer extremity of the cell; the antemedial, postmedial, and submarginal lines are outwardly angled about the middle. The hindwings have a brownish discoidal spot, and from this a line of the same colour runs to the inner margin; postmedial line obscure towards the costa; submarginal line angled at the middle. Fringes white

with a fine brownish line at their base. The venation of the forewings brownish, and of the hindwings faintly so.

Expanse 29 mm.

Male type from Yoshino, Yamato, July, 1895.

Two female specimens taken at the same locality, June, 1899, and July, 1901.

Local distribution. HONDO.
Habitat. JAPAN.
Collection number, 1685.

419.

Pionea exigualis, sp. n.

♂. Forewings pale cinnamon brown with obscure darker ante- and postmedial lines, the latter wavy, bent inwards at vein 3; a dusky mark at outer extremity of the cell. Hindwings paler. Underside of forewings whitish brown, and of hindwings whitish; all the wings have an obscure discal mark and a dusky postmedial line.

Expanse 18 mm.

Male type from Yezo (*Andrews*).

Local distribution. YEZO.
Habitat. JAPAN.
Collection number, 1638.

420.

Pionea thyalis.

Botys thyalis, Walk., Cat. Lep. Het., xviii, p. 667 (1859); Leech, Trans. Ent. Soc. Lond., 1901, p. 497.

One male specimen taken at Kiire, Satsuma, July, 1895.

Hitherto unrecorded from Japan.

Local distribution. KYŪSHŪ.
General distribution. CHINA; JAPAN.
Collection number, 1605.

421.

Pionea tritalis.

Pionea tritalis, Chr., Bull. Mosc., 1881, i, p. 20.

One female specimen taken at Shiokubi, Oshima, in July, 1902.

Hitherto unrecorded from Japan.

Local distribution. YEZO.
General distribution. E. SIBERIA (Amurland, Ussuri); N. CHINA; JAPAN.
Collection number, 1693*a*.

422.

Pionea prunalis.

Pyralis prunalis, Schiff., Wien. Verz., p. 121 (1776).
Pionea prunalis, Staud., Cat. Lep. pal., ii, p. 62 (1901).

One specimen in the National Collection labelled Japan?, 81, ex Zeller Collection.
Hitherto unrecorded from Japan.

General distribution. EUROPE; ? JAPAN.

Genus PYRAUSTA.

Schrank, Fauna Boica, ii, 2, p. 163 (1802); Hampson, Fauna Brit. India, Moths, iv, p. 429 (1896).

423.

Pyrausta andrewsalis, sp. n. (Plate XXX, fig. 7.)

♂. Forewings purplish brown suffused with greyish; a yellow patch on the inner margin towards the base, intersected by the antemedial line; a yellow spot in the cell, intersected by the discal lunule, and a sinuous yellow band inwardly margined by the postmedial line; the band is sharply contracted about the middle, and the transverse lines are hardly darker than the ground-colour. Hindwings yellow, the outer margin broadly purplish brown suffused with greyish; the purplish brown postmedial line is highly sinuous and at vein 2 touches the discal lunule which is also purplish brown. Fringes yellow. Underside as above but paler.

♀. Similar to the male, but on the forewings there is a double yellow spot beyond the cell.

Expanse, 28 mm. ♂, 26 mm. ♀.

Male and female types from Yezo (*Andrews*).
Two male and one female specimens received from Mr. Andrews, Hakodate.

Local distribution. YEZO.
Habitat. JAPAN.
Allied to *P. signatalis*, Walk.
Collection numbers, 1614, 1993.

424.

Pyrausta cespitalis.

Pyrausta cespitalis, Schiff., Wien. Verz., p. 123 (1775).
Botys tendinosalis, Brem., Lep. Ost.-Sib., p. 99, pl. viii, fig. 10 (1864).
Pyrausta cespitalis, Leech, Trans. Ent. Soc. Lond., 1901, p. 505; Hampson, Fauna Brit. India, Moths, iv, p. 430 (1896).

Six male and five female specimens taken at Yoshino, Yamato, in June, July, August and September, 1899, 1900, 1901, and at Nikko in June, 1903. Some of these specimens are referable to the typical form and some to the *tendinosalis* form.

Hitherto unrecorded from Japan.

Local distribution. Hondo.
General distribution. Europe; Syria; Siberia; Afghanistan; Punjab; Dharmsála; Burma (Bernardymo).
Collection number, 1699.

425.

Pyrausta cilialis.

Pyrausta cilialis, Hübn., 119; Leech, Brit. Pyr., pl. vi, fig. 4.

Four male specimens taken at Hakodate, Ishikawa, and Junsai Numa, province of Oshima, in June and July, 1902, 1903.

Hitherto unrecorded from Japan.

Local distribution. Yezo.
General distribution. Europe; Amurland; Japan.
Collection number, 1717.

426.

Pyrausta contigualis.

Pyrausta contigualis, South, Trans. Ent. Soc. Lond., 1901, p. 506, pl. xiv, fig. 23.

Six male and three female specimens taken at Yoshino, Yamato, in May, June, September and October, 1895, 1899; at Kōbe in April, 1899, and at Jozanke, near Sapporo, Ishikari, in August, 1896.

Hitherto unrecorded from Japan.

Local distribution. HONDO; YEZO.
General distribution. WESTERN CHINA; JAPAN.
Collection number, 1095.

427.

Pyrausta hyalodiscalis.

Pyrausta hyalodiscalis, Warr., Ann. and Mag. Nat. Hist. (6), xvi, p. 471; Hampson, Fauna Brit. India, iv, p. 434 (1896).

One example of each sex taken at Yoshino, Yamato, in June and July, 1899, 1901.

Hitherto unrecorded from Japan.

Local distribution. HONDO.
General distribution. KHÁSIS; JAPAN.

This species was described by Warren from a female type. My male measures in expanse 20 mm., the female 22 mm. The male does not differ in pattern or coloration but the markings are not quite so bright as in the female.

Collection number, 1495.

ADDENDA.

Twenty species have been found to be new to the fauna of Japan since the manuscript of this paper was submitted to and accepted by the Entomological Society, and are therefore now incorporated as addenda. This includes some new species and others recorded by various authors and myself from Japan for the first time.

Family ARCTIADAE.

Sub-family *ARCTIANAE.*

Genus CREATONOTUS.

Hübner; Hampson, Fauna Brit. India, Moths, ii, p. 26 (1894).

1.

Creatonotus koui.

Creatonotus koui, Miyake, Tōkyo, Bull. Coll. Agric., viii, p. 153 (1909).

Genus Diacrisia.

Hübner, Verz., p. 169 (1827).

2.

Diacrisia surianensis.

Diacrisia surianensis, Miyake, Tōkyo, Bull. Coll. Agric., viii, p. 153 (1909).

3.

Diacrisia moltrechti.

Diacrisia moltrechti, Miyake, Tokyo, Bull. Coll. Agric., viii, p. 174 (1909).

4.

Diacrisia lutea japonica.

Diacrisia lutea japonica, Rothschild, Nov. Zool., xvii, p. 131 (1910).

5.

Diacrisia pseudolutea.

Diacrisia pseudolutea, Rothschild, Nov. Zool., xvii, p. 134 (1910).

Sub-family *LITHOSIANAE.*

Genus Pelosia.

Hübner, Verz., p. 165 (1827).

6.

Pelosia albicostata.

Pelosia albicostata, Hampson, Ann. and Mag. Nat. Hist. (7), viii, p. 179 (1901).

Described by Hampson from Japan.

Two male specimens in the British Museum Collection.

Habitat. Japan.

Genus Ilema.

Hübner, Verz., p. 165 (1827).

7.

Ilema brevipennis.

Lithosia brevipennis, Walk., Cat. Lep. Het., ii, 509 (1854); Moore, Lep. Ceyl., ii, p. 56, pl. cii, fig. 4; Hampson, Ill. Het. B. M., viii, pl. cxxxix, fig. 11; Fauna Brit. India, Moths, ii, p. 82, ♀; Kirby, Cat. Het., p. 329.

Lithosia intermixta, Walk., xxxi, 229 (1864); Hampson, Ill. Het. B. M., ix, pl. clviii, fig. 1; Fauna Brit. India, Moths, ii, p. 84; Kirby, Cat. Het., p. 329.

Katha punctifera, Hampson, Ill. Het. B. M., ix, p. 80, pl. clviii, fig. 22, ♀ (1893).

Systropha fuscipes, Hampson, Ill. Het. B. M., ix, p. 80, pl. clviii, fig. 23 (1893); Fauna Brit. India, Moths, ii, p. 83.

Ilema brevipennis, Hampson, Cat. Lep. Phal., ii, p. 172 (1900).

Japan is not mentioned by Hampson as one of the localities for this species, but there are specimens from that country in the British Museum series.

Local distribution. Kyūshū (Kyūshū (*Leech*), Nagasaki (*Leech*)).

General distribution. India; Ceylon; Borneo; Sambawa; Corea; China (Moupin); Japan.

8.

Ilema vicaria.

Lithosia vicaria, Walk., Cat. Lep. Het., ii, 505 (1854); Kirby, Cat. Lep. Het., p. 223.

Lithosia antica, Walk., *l. c.*; Moore, Proc. Zool. Soc. Lond., 1878, p. 15, pl. i, fig. 9; *id.*, Lep. Ceyl., ii, p. 56, pl. cii, fig. 3; Hampson, Fauna Brit. India, Moths, ii, p. 79; Kirby, Cat. Het., p. 325.

Lithosia natara, Moore, Cat. Lep. E. I. C., p. 304 (1859); Kirby, Cat. Het., p. 325.

Lithosia imitans, Mab., Bull. Soc. Ent. Fr., iii, p. 87 (1878).

Ilema vicaria, Hampson, Cat. Lep. Phal., ii, p. 165 (1900).

Recorded by Hampson from Japan; unrecorded by Leech.

One specimen in British Museum Collection from Yezo, Japan.

Local distribution. YEZO (*Pryer*).

General distribution. AFRICA; INDIA; CEYLON; ANDAMANS; NICOBAR ISLANDS; BURMA; SINGAPORE; BORNEO; JAVA; CHINA; AMURLAND; LOOCHOO ISLANDS; JAPAN.

Family NOCTUIDAE.

Sub-family *ERASTRIANAE.*

Genus HYPOSADA.

Hampson, Cat. Lep. Phal., x, p. 273 (1911).

9.

Hyposada mesophaea.

Hyposada mesophaea, Püng.; Hampson, Cat. Lep. Phal., x, p. 279, pl. clvii, fig. 4 (1911).

There is only a coloured figure of this species in the B. M. Collection.

The type is in collection Püngeler.

General distribution. JAPAN.

Sub-family *HADENINAE.*

Genus MONIMA.

Hübner, Verz., p. 229 (1827).

10.

Monima constabilis, sp. n.

♀. Forewings reddish brown; ante- and postmedial lines indicated by black dots on the veins; subterminal line pale ochreous, inwardly edged with dark reddish brown, indented below costa; traces of a dusky central shade on the dorsal area; reniform and orbicular stigmata outlined in pale ochreous, the lower end of the former darker. Hindwings fuscous grey with a dusky irregular central line. Underside shining greyish, the forewings suffused with dusky; hindwings have a black dot at end of the cell, and all the wings a series of more or less connected black dots forming a postmedial line.

♂. Antennae bipectinated similar to the female in colour and marking but the central line of hindwings, upper surface, is less distinct; the postmedial lines of under surface are also less defined.

Expanse, 40 mm. ♀, 38 mm. ♂.

Three female specimens from Yokohama in the British Museum, in one of which the terminal area of forewings is suffused with blackish.

Male type in collection Püngeler.

Habitat. JAPAN.

Sub-family *HYPENINAE.*

Genus PARAGONA. *Antea*, p. 266.

11.

Paragona obliquisigna.

Metachrostis obliquisigna, Hampson, Fauna Brit. India, Moths, ii, p. 326 (1894).

This species, which I referred to *Ozarba* (?) on page 230 of this paper, is, I discover, placed in *Paragona* by Hampson in B. M. Collection.

Genus PROLOPHOTA.

Hampson, Fauna Brit. India, Moths, iv, p. 546 (1896).

12.

Prolophota trigonifera.

Prolophota trigonifera, Hampson, Fauna Brit. India, Moths, iv, p. 547 (1896).

Three female specimens from Japan. One from Kagoshima, province of Satsuma, July 15, 1895. The other two specimens are not localised or dated, but probably come from Yoshino, province of Yamato.

Hitherto unrecorded from Japan.

Local distribution. KYŪSHŪ.

General distribution. CEYLON (type ♀); JAPAN.

Collection number, 1372.

Family LYMANTRIADAE.

Genus STILPNOTIA, Westwood.

13.

Stilpnotia candida.

Stilpnotia salicis, var. *candida,* Staud., Rom. sur Lép., vi, 308 ; Cat. Lep. pal., i, p. 117, 925*a* (1901).

I bred imagines of *candida* in August, 1902, from larvae taken at Hakodate. They are different from larvae of *salicis*, and *candida* should therefore be separated as a distinct species. *Candida* is recorded from Japan by Staudinger as a variety of *salicis*.

Local distribution. YEZO.

General distribution. URGA; CHINA; E. SIBERIA (Ussuri, Amurland); COREA; JAPAN.

Family GEOMETRIDAE.

Sub-family *BOARMIANAE*.

Genus CORYMICA.

Walker, Cat. Lep. Het., xx, p. 230 (1860).

14.

Corymica arnearia.

Corymica arnearia, Walk., Cat. Lep. Het., xx, p. 231; Hampson, Fauna Brit. India, Moths, iii, p. 185 (1895).

Caprilia vesicularia, Walk., Cat. Lep. Het., xxxv, p. 1569.

There are three specimens of this species in the B. M. Collection.

Hitherto unrecorded from Japan.

Local distribution. KYŪSHŪ, Nagasaki (*Leech*).

General distribution. INDIA; ASSAM; BURMA; PULO LAUT; PENANG; SUMATRA; BORNEO; W. CHINA; JAPAN.

Genus ACANTHOCAMPA.

Dyar, Proc. U. S. Nat. Mus., xxviii, p. 951 (1905).

15.

Acanthocampa excavata.

Acanthocampa excavata, Dyar, Proc. U. S. Nat. Mus., xxviii, p. 951, fig. 18 ♂ (1905).

Dyar states that this species is probably *Zamacra albofasciaria*, Leech; but that he has been unable to consult the original description and founds a new genus for it. I have examined *Zamacra albofasciaria* in the British Museum Collection, and have compared it with Dyar's figure of *excavata*. The two species do not agree in the

contour of the postmedial and antemedial lines which are wavy in *excavata* but are more regularly curved in *albofasciara*. They are probably distinct, but it would not be safe to say without seeing Dyar's type.

Habitat. JAPAN.

Sub-family *GEOMETRINAE.*

Genus POECILOCHLORA.

Warren, Nov. Zool., xi, p. 305 (1904).

16.

Poecilochlora laceratariа.

Thalera laceratariа, Graeser, Berl. ent Zeit., p. 387; Staud., Iris, x, p. 11, pl. i, fig. 4.

Hitherto unrecorded from Japan.

Two specimens from Pryer's collection in British Museum labelled Japan.

General distribution. YUNNAN; CHINA (Washan, 6000 ft.); COREA; JAPAN.

Family PSYCHIDAE.

Sub-family *OECETICINAE.*

Genus PACHYTELIA.

Pachytelia, Westwood, Proc. Ent. Soc. Lond., v, p. 42 (1848).

Pachytelia, Heylaerts, Ann. Soc. Ent. Belge, xxv, p. 42 (1881).

17.

Pachytelia asiatica.

Psyche unicolor, var. *asiatica*, Staud., Rom. sur Lép., vi, p. 302 (1892).

Canephora unicolor, Kirby, Cat. Lep. Het., p. 509 (1892).

Pachytelia unicolor, Staud., Cat. Lep. pal., i, p. 393 (1901).

Psyche unicolor, Leech, Trans. Ent. Soc. Lond., 1898, p. 352.

Three specimens in B. M. Collection from Japan ex Pryer collection.

Recorded by Leech from Japan under *Psyche unicolor*, but separated in the B. M. Collection as a distinct species.

General distribution. China (Foochow); Japan.

Family ZYGAENIDAE.

Sub-family *ZYGAENINAE.*

Genus Illiberis.

Walker, Cat. Lep. Het., ii, p. 289 (1854).

18.

Illiberis pruni.

Illiberis pruni, Dyar, Proc. U. S. Nat. Mus., xxviii, p. 954 (1905).

Described by Dyar from Japan.

Habitat. Japan.

Family PYRALIDAE.

Genus Pyrausta.

19.

Pyrausta polygoni.

Pyrausta polygoni, Dyar, Proc. U. S. Nat. Mus., xxviii, p. 955 (1905).

Described by Dyar from Japan.

Habitat. Japan.

Genus Pagyda.

Walker, Cat. Lep. Het., xvii, p. 487 (1859).

20.

Pagyda quinquelinealis.

Pagyda quinquelinealis, Hering.

Six specimens in B. M. Collection from Japan.

Local distribution. Hondo (Yokohama, Tōkyo); Nagasaki; Kyūshū; Yezo (Hakodate).

General distribution. Central and West China (Ichang, Moupin); Japan.

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EXPLANATION OF PLATES XXX, XXXI.

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XVI. *Bryocorina nonnulla aethiopica descripta, ab* O. M. Reuter, Hon. F. E.S., *et* B. Poppius, *cum tabula colorata.*

[Read February 1st, 1911.]

Plate XXXII.

PHYSOPHOROPTERA, Popp.

Popp. in Sjöstedt, Kilimandjaro, Meru, Exp., 12, Hem. No. 4, p. 26.

Corpus sat oblongum, nitidum, inpunctatum, pilis destitutum. Caput verticale, ab antico visum sat acuminatum, longitudine parum latius, a supero visum longitudine circiter duplo latius, a latere visum longitudine distincte altius, fronte a supero visa antice late arcuata, clypeo sat prominente, a fronte distincte discreto, margine antico modice arcuato, angulo faciali subrecto, genis altis, gula brevi. Oculi sat magni, breviter pedunculati, fortiter prominentes. Rostrum coxas intermedias attingens, articulo primo brevissimo et crasso, basin capitis haud attingente. Antennae articulis duobus primis nitidis, pilis destitutis, duobus ultimis magis opacis, breviter adpressim pilosis, articulo primo capite a supero viso duplo longiore, apice sat fortiter clavato-incrassato, secundo nonnihil longiore, primo aeque crasso, sed apice minus incrassato, articulis duobus ultimis fortiter incrassatis, quarto tertio paullo crassiore et nonnihil breviore, tertio primo breviore. Pronotum fortiter convexum, apicem versus fortiter declive, longitudine nonnihil latius, strictura apicali lata, margine basali margine apicali multo latiore, medio late sinuato, lateribus leviter rotundatis, callis obsoletissime discretis, minutissimis, planis. Scutellum structura variabile, sed semper altissime inflatum. Hemielytra abdomine longiora, ante basin cunei in umbonem altum buccata, embolio angustissimo, cuneo a corio obsolete discreto, membrana obscura, areola sat elongata, angulo interiore apicali nonnihil rotundato. Alae hamo destitutae. Mesosternum longum, convexum. Metastethium orificiis haud discretis. Segmentum secundum genitale feminae apice constrictum. Pedes sat longi, femoribus apice incrassatis, tibiis et tarsis breviter pilosis, pilis sub angulo acuto exsertis, articulo primo sat incrassato, reliquis simul sumtis aeque

longo, secundo tertio breviore, hoc apice incrassato, aroliis unguiculorum latis, iis parallelis et ad partem cum iis connexis, unguiculis basi dente instructis.

Typus: *Ph. mirabilis*, Popp., *l. c.*, p. 27.
(Plate XXXII, fig. 1.)

PHYSOPHOROPTERA DENTICOLLIS, n. sp.
(Plate XXXII, fig. 2.)

Flava, capite postice nigro-fusco, pronoto, parte antica excepta, scutelloque rubris, apice extremo angulorum posticorum pronoti, spina scutelli, macula basali clavi, macula adjacente corii umbonèque apicali ejusdem, apice cunei abdominisque, nec non extremo apice rostri nigris; membrana fusco-nigra, venis fuscis; abdomine superne apice rubro. (Antennae pedesque mutilati.)

Caput fere ut in *Ph. mirabili* constructum, sed multo majus et praecipue latius, oculis multo majoribus et fortius prominentibus, fronte profundius sulcata. Pronotum pone medium ad marginem posticum callorum constrictum, his obsoletis et cum strictura apicali indistincta confluentibus, parte postica sat convexa, versus apicem fortissime declivi, basi medio elevatione parva instructa, utrinque fortissime tumido-elevata, angulis basalibus fortiter et longe productis, antrorsum arcuatis, acutis, lateribus igitur basin versus sinuatis, margine basali (usque in angulos) margine apicali magis quam duplo latiore, longitudine disci circiter $\frac{1}{3}$ latiore. Scutellum fortiter inflatum, scutello *Ph. mirabilis* tamen humilius, ab antico visum lateribus haud constrictum, a latere visum margine postico leviter sinuato, superne antice spina antrorsum vergente, sat crassa, vix curvata, obtuse acuminata, hac spina circiter medio ramum aeque longum, sursum et leviter antrorsum vergentem, acuminatum emittente, lateribus antice circiter usque ad medium fortiter marginatis.

Long. 7, lat. $2,_5$ mm.

Species structura insigni pronoti et scutelli excellens.

Patria: KONGO, Landana, D. P. Klein, 1875, mas mutilatus (Mus. Paris).

LYCIDOCORIS, n. gen.

Corpus oblongum, retrorsum leviter ampliatum, leviter nitidum, thorace remote, hemielytris sat adpressim, modice longe, dense flavopilosis, pilis capitis partisque anterioris pronoti obscuris. Caput fortiter nitidum, verticale, pone oculos in collum breve constrictum, ab

antico visum longitudine paullo latius, a latere visum altitudini aeque longum, fronte fortiter convexa, a supero visa antice late arcuata et parum prominente, clypeo sat prominente, a fronte distincte discreto, a latere viso parallelo, angulo faciali subrecto, genis modice altis, gula sat longa. Oculi magni, prominentes, laeves. Rostrum crassum, apicem coxarum anticarum subattingens, articulo primo medium gulae vix attingente. Antennae infra medium marginis antici oculorum insertae, crassae, sat breves, sat remote nigro-pilosae, articulo primo reliquis paullo longius piloso, modice incrassato, latitudini frontis oculique unici circiter aeque longo, secundo primo multo longiore, apicem versus sensim incrassato et apice primo aeque crasso, tertio secundo breviore, sat fusiformi, primo paullo crassiore, quarto brevissimo, primo breviore, fusiformi et reliquis multo graciliore. Pronotum margine basali longitudine mediana disci sat latiore et margine apicali multo latiore, medio late sinuato, angulis posticis rotundatis, basi intra illos leviter longitudinaliter impressa, lateribus rectis, disco leviter convexo, nonnihil declivi, dense et fortiter punctato, callis nitidis, laevibus, bene determinatis, planis, medio confluentibus, externe latera attingentibus, strictura apicali lata, bene discreta, nonnihil rugolosa. Scutellum latitudine nonnihil longius, planum, ut pronotum punctatum. Hemielytra abdomen superantia, dense et quam pronotum subtilius rugoso-punctata, embolio angusto, membrana obscura, subvenoso-strigata, areola elongato-triangulari, angulo apicali interiore fere recto. Alae obscurae, nigro-fuscae, areola hamo destituta. Corpus inferne fortiter nitidum, inpunctatum, solum propleuris ut pronotum punctatis. Mesosternum longum, convexum. Metastethium orificiis haud discretis. Metapleura angulo apicali exteriore retrorsum acuminato-producto. Pedes longissime dense pilosi, pilis exsertis, femoribus haud incrassatis, tarsis articulo primo secundo fere duplo longiore, duobus primis simul sumtis tertio nonnihil brevioribus, hoc apicem versus dilatato, aroliis latis, usque a basi fortiter divergentibus, unguiculis dente basali destitutis.

Genus structura insigni antennarum mox distinguendum. Typus: *L. mimeticus*, n. sp.

Lycidocoris mimeticus, n. sp.

(Plate XXXII, fig. 3.)

Rufescenti-ochraceus, capite nigro, antice infra insertionem antennarum, lateribus pone oculos, raro etiam fronte rufescenti-ochraceis, vitta longitudinali mediana pronoti usque in apicem scutelli producta, sutura clavi angustissime, cuneo toto vel solum apice, mem-

brana, corpore inferne, rostro, antennis pedibusque nigris, prosterno, medio metasterni, lateribus metastethii abdomineque rufis, apice hujus nigro; articulo primo tarsorum unguiculisque vel tarsis totis testaceis vel fusco-testaceis.

Frons maris et feminae diametro oculi paullo minus quam duplo latior. Antennae maris quam feminae nonnihil robustiores, articulo secundo primo duplo et tertio $\frac{1}{3}$ longiore. Pronotum margine basali capite cum oculis circiter duplo et longitudine mediana disci sui $\frac{1}{3}$ nec non margine apicali paullo magis quam duplo latiore.

Long. 9–12,$_5$ mm., lat. 3–4 mm.

Patria: Togo, Bismarcksburg, m. julii–sept. 1890, junii et julii 1891, D. R. Büttner, m. martii, oct. 1893, D. L. Conradt, specimina numerosa (Mus. Berol., Paris et Helsingf.); Kamerun, D. L. Conradt (Mus. Berol.); Ora Guineae Eboris: San Pedro, D. G. Thoiré (Mus. Paris); Tanganyika orientalis: Kwa Mtau Uvinsa, d. 26–29 oct. 1899, D. Glauning (Mus. Berol.).

Haec species colore staturaque speciebus quibusdam aethiopicis familiae coleopterorum *Lycidae*, praecipue generis *Lycus* simillima est.

ODONIELLA, Hagl.

Hagl., Öfv. Svensk. Vet. Ak. Förh., 1895, No. 7, p. 468. —Reut., Öfv. Finsk. Vet. Soc. Förh., xlvii, 1904–1905, No. 10, p. 2.

Corpus sat latum. Caput parvum, a supero et antico visum longitudine multo latius, a latere visum longitudine multo altius, nitidum, inpunctatum, pone oculos magis minusve constrictum, fronte verticali, a supero visa antice latissime et brevissime prominente, clypeo modice prominente, a fronte discreto, a latere viso subparallelo, angulo faciali acutiusculo, genis parum altis, gula brevi. Oculi sat parvi, a margine basali capitis distantes, laeves, fortiter subpedunculato-prominentes. Rostrum apicem coxarum anticarum superans, articulo primo incrassato, basin capitis attingente. Antennae paullulum ante medium marginis anterioris oculorum insertae, articulo primo pilis nonnullis instructo, reliquis dense sat breviter pilosis, pilis sub angulo acuto exsertis, articulo primo brevissimo, capite circiter dimidio breviore, fortiter incrassato, secundo primo multo longiore et hoc graciliore, apicem versus sensim leviter incrassato, tertio secundo breviore, etiam apicem versus sensim sed fortius incrassato et apice primo circiter aeque crasso (art. quartus speci-

minum omnium a nobis examinatorum mutilatus). Pronotum et scutellum pilis sparsis, tenuibus, facile divellendis vestita, dense fortiterque impresso-punctata. Pronotum margine basali longitudine mediana, ut etiam margine anteriore multo latiore, medio sinuato, strictura apicali sat lata, laevi, callis medio distantibus, optime determinatis, planis et laevibus, lateribus a strictura sensim divergentibus et arcuatis, ante medium nonnihil constrictis et dein fortius divergentibus et arcuatis, lobum posticum sub-semi-circularem terminantibus, hoc lobo disco magis minusve convexo, apicem versus sat fortiter declivi, latera versus explanato et lateribus marginato. Scutellum fortiter inflatum, postice late rotundatum. Hemielytra abdomen superantia, obsoletissime punctata, breviter pallide pubescentia, embolio angusto, apicem versus haud vel parum dilatato, cuneo latitudine longiore, membrana areola magis minusve producta. Corpus inferne laeve et nitidum, solum propleuris punctatis. Metastethium orificiis obsoletis. Metapleura angulo apicali exteriore sat longe acuminato-producto. Pedes breves, sub angulo acuto pilosi, articulo ultimo tarsorum apice vix incrassato, aroliis unguiculorum latis, usque a basi fortiter divergentibus.

Typus: *O. reuteri*, Hagl., *l. c.*

A genere *Rhopalicoschatus*, Reut., oculis in genas longius extensis, genis parum altis, antennis mox ante medium marginis anterioris oculi insertis distinguendum.

Odoniella apicalis, n. sp.

(Plate XXXII, fig. 4.)

Rubra, membrana lutescente, parum hyalina, oculis, apice membranae apiceque extremo articuli ultimi tarsorum nigro-fuscis.

Vertex diametro oculi triplo latior, sulco mediano longitudinali tenuissimo et obsoleto instructus. Rostrum apicem prosterni nonnihil superans. Antennae articulo primo apicem clypei subattingente. Pronotum margine basali longitudine mediana disci paullo magis quam $\frac{1}{3}$ et margine apicali paullo minus quam quadruplo latiore. Membrana areola sat angusta, apicem cunei superante, angulo apicali interiore acuminato.

Long. 8–9 mm., lat. 3–$3_{,3}$ mm.

Ab. *O. rubra*, Reut., corpore magis oblongo, colore pallide lateritio nec sanguineo, pronoto minus profunde impresso-punctato, scutello minus alte inflato corioque innotato divergens.

Patria: Togo, Bismarcksburg, m. junii 1891, D. R. Büttner, d. 27 junii–8 julii 1893, D. L. Conradt (Mus. Berol.).

CHAMUS, Dist.

Dist., Ann. Mag. Nat. Hist., Ser. 7, xiii, 1904, p. 197.

Corpus oblongo-ovatum, sat nitidum, longe remote pallido-pilosum. Caput verticale, a supero visum longitudine paullo latius, antice latissimum, postice angustatum, lateribus a basi ad paullo ante medium parallelis, transversim strigosis, ab antico visum longitudine multo latius, a latere visum altitudine longius, vertice ad marginem anticum impressione triangulari instructo, fronte fere sub angulo recto declivi, antice spina mediana aliaque utrinque supra insertionem antennarum armata, hac spina apicem versus sursum et extrorsum rectangulariter curvata, vertice postice elevationibus duabus planiusculis, clypeo fortiter prominente, a fronte obsolete discreto, a latere viso subparallelo, angulo faciali leviter acutiusculo, genis sat parvis, gula longa, horizontali. Oculi a basi capitis longe remoti, ad marginem apicalem capitis a supero visi appropinquati, valde prominentes, modice magni, subtiliter granulati. Rostrum breve, sat crassum, coxas anticas attingens. Antennae mox infra medium marginis anterioris oculorum in scapulo parvo insertae, articulo primo fortiter incrassato, mox ante medium crassissimo, margine interiore convexo, exteriore subrecto, pilis longis exsertis dense piloso vel subsetoso, articulis reliquis sat gracilibus, pilis longis tenuibus subexsertis dense pilosis et pilis aliis subsetiformibus longissimis exsertis hic illic instructis, articulo primo capite longiore, secundo primo multo longiore, tertio secundo breviore et quarto fere duplo longiore. Pronotum margine basali capite paullo margineque suo apicali multo latiore, longitudine mediana disci vix longiore, subrecte truncato, utrinque leviter impresso, lateribus paullo pone medium leviter sinuatis dein late rotundatis, disco paullo pone medium transversim fortiter impresso lobo basali sat convexo, apicem versus modice declivi, praecipue lateribus sat fortiter granulato, callis medio late distantibus, versus latera extensis, leviter convexis, strictura apicali gracili. Scutellum longitudine latius, basi leviter impressum. Hemielytra abdomen longe superantia, basi clavi et corii, venis apiceque corii, nec non cuneo praecipue basi granulatis, corio margine externo medio late sinuato, medio pellucido, apicem versus dilatato, embolio lato, cuneo latissimo, magno, corio vix $\frac{1}{3}$ breviore, membrana areola angulo apicali interiore acuto. Alae areola hamo destituta. Mesosternum sat longum. Pedes modice longi, pilis longis, exsertis, sat dense

pilosi, femoribus vix incrassatis, tarsis articulis duobus primis brevibus, longitudine aequalibus, simul sumtis tertio distincte brevioribus, hoc apice leviter dilatato, aroliis cum unguiculis connexis, his dente basali destitutis.

Genus structurâ capitis et antennarum a reliquis distinctissimum.

Typus: *Ch. wealei*, Dist., *l. c.*

Chamus incertus, n. sp.

(Plate XXXII, fig. 5.)

Capite castaneo-rufo, lateribus castaneis; pronoto rubro, lateribus late castaneis, linea angusta longitudinali basique medio flavescentibus; scutello, basi clavi et corii margineque hujus apicali late, nec non embolio, parte media semi-pellucida excepta, castaneis, macula mediana clavi et corii flava, apice clavi, granulis venisque corii, basi cunei interne venisque membranae rubris, ceteris partibus cunei membranaque flavo-pellucidis, hac medio vitta lata obscure griseo-fumata; antennis articulo primo rubro; articulo secundo antennarum (ultimi desunt), rostro, pedibus corporeque inferne flavis, mesosterno rufescente.

Caput (♀) vertice diametro oculi circiter duplo latiore, spina apicali lateralibus breviore, recta, vix sursum curvata, spinis lateralibus ante apicem angulato-curvatis. Antennae articulo secundo primo vix magis quam duplo longiore. Pronotum margine basali capite duplo et margine apicali circiter triplo latiore.

Long. 7 mm., lat. 3 mm.

Ch. wealei, Dist., valde affinis videtur, cum descriptione tamen haud in omnibus congruit: color nonnihil divergens, spina mediana capitis lateralibus brevior et recta, sursum vix curvata, etiam clavus granulatus; a *Ch. mefistone* colore, spina capitis mediana longiore articuloque secundo antennarum breviore distinguendus.

Patria: Pinetown, Ertl., 1 ♀ (Mus. Vindob.).

Chamus mefisto, n. sp.

(Plate XXXII, fig. 6.)

Ruber, lateribus pronoti, scutello, basi clavi et corii apiceque hujus obscurioribus, articulis secundo et tertio antennarum (quartus deest), macula mediana clavi, macula magna mediana corii, hac apicem versus angustata, maculisque duabus minoribus pone medium (maculis omnibus laevibus et nitidis), corpore inferne, rostro pedibusque flavis; pronoto medio flavescenti-rubro, embolio medio

hyalinescente, cuneo sat pellucido, dilute flavescente, basi rubro; membrana flavescenti-pellucida, medio vitta griseo-fumata, venis rubris; mesosterno flavescenti-rubro.

Caput (♀) vertice diametro oculi magis quam duplo latiore, spina mediana brevissima, recta, sursum haud curvata, spinis lateralibus longis, apicem versus angulato-curvatis. Antennae articulo secundo primo paullo magis quam duplo et tertio circiter $\frac{2}{3}$ longiore. Pronotum margine basali capite vix $\frac{1}{3}$ et margine apicali circiter triplo latiore. Clavus apice granulis parcius adsperso.

Long. $7,_5$ mm., lat. $3,_2$ mm.

Ch. wealei, Dist., affinis, colore divergente structuraque spinae medianae capitis antennarumque distinguendus.

Patria: AFRICA OCCIDENTALIS, Togo, D. Kling, 1 ♀ (Mus. Berol.).

CHAMOPSIS, n. gen.

Corpus oblongo ovale, opacum, capite, pronoto scutelloque sat longe pallido-pilosis, hemielytris brevius adpressim pallido-pilosis. Caput antice sat dilatatum, fere ut in genere *Chamus* Dist. constructum, a supero visum longitudine latius, ab antico visum longitudine distincte latius, a latere visum altitudini circiter aeque longum, vertice et fronte sulco tenui longitudinali instructis, illo sulco tenuissimo transversali, hac antice spinulis tribus verticalibus armata, quarum ut in *Chamo* una mediana apicali unaque utrinque supra insertionem antennarum, clypeo modice prominente, a fronte distincte discreto, a latere viso subparallelo, angulo faciali leviter acutiusculo, genis sat parvis, gula modice longa. Oculi a basi capitis longe remoti, parum magni, prominentes, in genas parum extensi. Rostrum modice incrassatum, coxas anticas paullo superans, articulo primo usque ad marginem basalem capitis haud extenso. Antennae ut in *Chamo* insertae, articulo primo valde robusto, ante medium crassissimo, capite longiore, dense et sat fortiter granuloso, dense et longe exserte piloso, articulis reliquis modice gracilibus, omnibus crassitie subaequalibus, secundo primo multo et tertio sat longiore, quarto primo paullo breviore, duobus ultimis parcius exserte pilosis. Pronotum capite multo latius, strictura apicali solum utrinque ad latera discreta, lateribus leviter sinuatis, subtiliter crenulatis, margine basali subrecte truncato, solum versus latera rotundato, intra angulos posticos leviter impresso, disco cum callis et strictura apicali, his tamen obsoletius, dense et in lobo postico fortiter granuloso, pone medium fortiter impresso, callis sat convexis, bene discretis, medio late distantibus, usque in latera extensis, lobo postico fortiter convexo, versus apicem sat declivi.

Scutellum planum, latitudini aeque longum, disco longitrorsum impressum. Hemielytra abdomine multo longiora, clavo et corio sat dense subtiliter granulatis, cuneo obsolete granulato, corio externe ante medium leviter sinuato, versus apicem nonnihil dilatato, embolio modice angusto, toto coriaceo, margine exteriore subtiliter crenulato, cuneo magno, latitudine paullo longiore, membrana areola modice angusta, angulo hujus apicali interiore acuminato. Alae areola hamo destituta. Mesosternum longum. Pedes modice longi, femoribus haud incrassatis, tibiis pilis longis semi-exsertis pilosis, tarsis articulo primo secundo nonnihil longiore, tertio his simul sumtis parum longiore, apice leviter dilatato, aroliis latis, cum unguiculis connexis, his dente basali instructis.

Generi *Chamus*, Dist., proxima, corpore opaco, dense granuloso, pilositate antennarum et pedum structuraque illarum, nec non embolio toto coriaceo divergens.

Typus: *Ch. conradti*, n. sp.

Chamopsis conradti, n. sp.

(Plate XXXII, fig. 7.)

Fusco-testacea, pronoto medio, scutello, embolio, cuneo, corpore inferne medio, rostro, articulo secundo antennarum pedibusque flavis, membrana griseo-fusca, lateribus flavescente; venis membranae, margine interiore cunei, apice articuli secundi antennarum articulisque duobus ultimis rubris, articulo primo antennarum castaneo-rubro.

Caput (♀) vertice diametro oculi fere triplo latiore, spina apicali frontis lateralibus solum paullulum breviore, his versus apicem leviter extrorsum curvatis. Antennae articulo primo capiti partique apicali pronoti usque ad marginem apicalem callorum longitudine subaequali, secundo primo paullo magis quam duplo et tertio paullo minus quam duplo longiore. Pronotum margine basali capite circiter duplo et margine apicali pronoti paullo minus quam triplo latiore.

Long. 6 mm., lat. $2{,}_5$ mm.

Patria: Kamerun, Zoh.-Alberts Höhe, d. 25 jan. 1899, D. Conradt, 1 ♀ (Mus. Berol.).

Explanation of Plate XXXII.

[*See Explanation facing the* Plate.]

Explanation of Plate XXXII.

Fig.

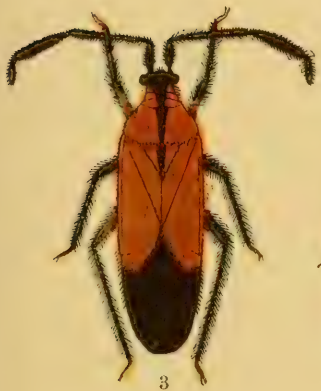
1*a*. *Physophoroptera mirabilis*, Popp, p. 409.
1*b*. *Physophoroptera mirabilis*, profile, p. 409.
2*a*. *Physophoroptera denticollis*, n. sp., p. 409.
3. *Lycidocoris mimeticus*, n. sp., p. 410.
4. *Odoniella apicalis*, n. sp., p. 412.
5. *Chamus incertus*, n. sp., p. 414.
6. *Chamus mefisto*, n. sp., p. 414.
7. *Chamopsis conradti*, n. sp., p. 416.

1a

1b

2a

2b



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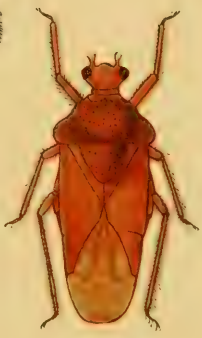

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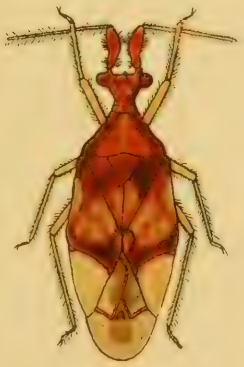

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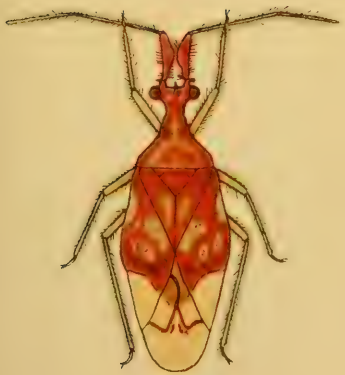

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NEW SPECIES OF BRYOCORINA.

XVII. *A factor in the production of mutual resemblance in allied species of Butterflies: a presumed Müllerian combination of* Euploeas *in South India and* Amauris *in South Africa.* By Lieut.-Colonel N. Manders, F.Z.S., F.E.S.

[Read February 1st, 1911.]

It may be in the recollection of some of the Fellows of the Society that shortly after the appearance of Mr. J. C. Moulton's paper in our Transactions in 1908 * I expressed the opinion in a letter to Mr. Tutt that some cause other than the experimental attacks of young birds produced the very remarkable similarity which is so noticeable among the three species of *Euploea* inhabiting South India, and which Mr. Moulton describes and figures as a Müllerian combination.

In the absence of Mr. Moulton, Professor Poulton replied to my criticisms, and I have hitherto refrained from further discussion in the hope that I might have an opportunity of proceeding to Southern India to study these insects in their native haunts, and ascertain whether there was any substantial reason for upholding Mr. Moulton's view or my own. I have had the good fortune lately to spend three months in different parts of that country where these insects occur, and I venture, therefore, to express the conclusions to which I have come.

It is not my purpose to discuss the whole Müllerian theory, this I hope to do when my tour of foreign service is over; but I may say that my observations and experiments on birds in the wild state do not support the opinion largely held by entomologists that Danaines and Euploeines are practically free from the attacks of birds; so far as my experience goes at present they are as liable

* "On some of the principal Mimetic (Müllerian) Combinations of Tropical American Butterflies." Sub-section "Certain Müllerian Combinations among the *Danainae* of the Old World," p. 603, pl. xxxiv.

to be seized and eaten by a hungry bird or lizard as other species of butterfly.

A Müllerian combination hypothesises that a number of evil-tasting butterflies, in this case three, were originally sufficiently dissimilar as to necessitate a young bird tasting a certain number of each in order to ascertain their inedibility or otherwise, and with a view to reducing the mortality thus caused these more or less dissimilar butterflies formed a pattern common to all, thus making a group or combination. There is no proof, as far as I know, that these South Indian butterflies have acted in this manner, and, as I shall show, one of them at any rate is over a large area of its distribution entirely isolated, not only from the other two, but from all other *Euploeas*, and at the same time it is in no way different from them, and therefore the evidence is against a departure from dissimilar ancestral types.

In the absence of any proof of experimental tasting on the part of young birds so far as the South Indian species of *Euploea* are concerned, it is, I think, advisable before accepting such as a Müllerian combination to study the geographical distribution of the butterflies in question to ascertain whether this throws any light on the subject. Before dealing with each species in detail I may say that the three in question, viz. *E. core*, *E. coreta* and *E. kollari* occur also in Ceylon as geographical races, and as such have received the names *E. asela*, *montana* and *sinhala* respectively, but to avoid confusion I shall refer to them under their continental names; and as *E. kollari* is itself a geographical race of *E. klugii* (*fide* de Nicéville) I shall use this name in connection with it.

No detailed description of these insects is necessary, as they have been figured by Mr. Moulton and by Mr. Moore in the Proceedings of the Zoological Society. I need only say that typically they are brown butterflies with a submarginal row of white spots on the fore and hind wing.

As the distribution of *E. coreta* is the most simple I will give it first. It extends from about the latitude of Bombay southwards to Ceylon. It is found on both sides of the Western Ghâts and also on the sea coast; it is very seldom met with above 6,000 ft., and is perhaps most common at 1,200 ft.; though very abundant where it occurs it is decidedly local and is very frequently accompanied by the ubiquitous *E. core*. It is, as figured by

Mr. Moulton, a butterfly with medium sized white spots on both wings, but in some specimens these are much smaller than in others. In Ceylon these white spots either disappear altogether on the forewing or are represented by obsolescent brownish markings rather paler than in the rest of the wing, but typical *E. coreta* is never found. In order to avoid repetition I may say that the other two species, likewise in Ceylon, lose their conspicuous white spots, these being replaced by pale brownish. We must assume that if the South Indian *Euplocas* are a Müllerian combination so also are their relations in the neighbouring island. *Euploea core* is by far the most abundant and widely distributed of the three. It is found in Ceylon and all over India, occurring even in the hottest and driest portions of the plains. In South India it closely resembles *E. coreta*, and like it in some specimens the spots are much smaller than in others. We find them increasing in size the further north we go, until in the North-West Himalayas they become so large that the insect was described by Butler as a distinct species, to which he gave the name *E. vermiculata*. Many years ago the late Mr. de Nicéville wrote as follows regarding this supposed species: "The *E. core* of North India approaches the *E. vermiculata* type in precisely the same way as the *E. core* of extreme South India approaches the *E. asela* (Ceylon) type . . . the type (*vermiculata*) is not constant even in the same locality. In a large series collected at Naiashahr in the Saharanpur district by Mrs. Deane, there were several specimens of typical *E. vermiculata* male and female, several of typical *E. core*, and numerous intermediate forms.*

It is in this part of its distribution, as well as in the plains of the Punjab that *E. core* is the only *Euploea* found. It is completely isolated from other members of the group, and we can assume in the absence of evidence to the

* I saw a typical *E. vermiculata* in the collection in the Coimbatore Museum, and on writing to the captor for information about it Mr. Hearsey, of the Indian Forest Department, writes, "*E. vermiculata* was captured by me March or April (cold weather, N. M.) 1899 in the Cuddapa District (Madras Presidency, N. M.) on the top of a detached hill known as Lanka-Malai at an elevation of about 3,000 ft., and I came across several more of them in the same locality, the only one with me being retained as a 'Sport.'" The form will evidently occur where the climatic conditions are favourable.

contrary that it still represents without any considerable modification the ancestral type.

The distribution of the third species, *E. klugii*, is somewhat peculiar, but its head-quarters is undoubtedly Assam. Thence eastwards it passes through Burma and Tenasserim to the Malay Peninsula, where there is no occasion to follow it, but westwards it occurs in Bhutan, Sikkim, Bengal, Maldah, and in the Madras Presidency in Ganjam, Godaveri and in the Gunter District south of the Kistna, not at all on the eastern side of the Western Ghâts, but somewhat scarce and local on the western side, and thence to the hill districts of Ceylon, where it is decidedly scarce and local.

In coloration it is very variable; in Ceylon, as I have said, it is like the former two, and in South India it likewise resembles them. As we trace its distribution north-eastwards through Maldah to Sikkim and Assam, the butterfly assumes more or less a blue gloss on the forewing, and to quote de Nicéville,* "in some parts of Bengal (Maldah) and in Sikkim specimens are met with entirely unglossed, or partly glossed with blue towards the base of the wing, while in Assam, Arakan and Pegu the whole of the forewing is usually most richly blue glossed. This phenomenon may be due to mimicry, as in the Khasia Hills of Assam, where *Pademmas* (to which subgenus of *Euploea*, *klugii* belongs, N. M.) are individually most numerous. *E. midamus* (now known as *N. mulciber*, N. M.) is also exceedingly common, and the *Pademmas* probably mimic it or some other blue glossed species. The only thing to be said against this theory is that in Maldah, where many specimens are most distinctly glossed with blue, there are no other blue *Euplocas* which these *Pademmas* could mimic; the occurrence of these latter in Maldah may, however, be due to immigration." I am confident, however, that Mr. de Nicéville would not have held or put forward this latter suggestion if he had been aware that a local form of *Euploea mulciber* (*kalinga*, Doherty) occurs not uncommonly as far south as the right bank of the Kistna, in the Madras Presidency, and where *E. klugii* is by no means rare; and if this was a case of mimicry *E. klugii* should here be blue glossed, but on the contrary it is always brown, and an

* "Note on the Indian Butterflies comprised in the subgenus Pademma of the Euploea," by L. de Nicéville, *Journal Asiatic Society of Bengal*, 1892, pl. ii, p. 237.

unobserved immigration over such an immense area is highly improbable.

It is now many years ago since he, either in a letter or in conversation, remarked to me that a butterfly with a deep blue-glossed wing is almost a sure indication of a habitat of deep jungle, great moisture and intense heat, and I have no doubt that in very many instances he is correct. In such a climate as the above, in the Khasia Hills, Assam, where the rainfall sometimes exceeds three hundred inches, the blue gloss on this otherwise brown butterfly is induced; in Maldah, where the country is more open, the rainfall less heavy but still abundant, and the heat very great, the blue gradually disappears; in Ceylon, where the climate varies again in the direction of lesser heat and rainfall, the blue entirely disappears, but the heat and rainfall are sufficiently great to prevent the spots, now deprived of their blue, from becoming conspicuous. On the western side of the Ghâts in South India neither the heat, rainfall nor moisture is so great as in Ceylon, and consequently the spots on both fore and hind wing become white and prominent.

This applies equally to the case of the more restricted *E. coreta*. In *E. core* the same applies, but in the Punjab with its scanty rainfall, dry heat and absence of forest, and in the lower ranges of the N.W. Himalayas, where there are several degrees of frost in the cold weather, the white spots become large and prominent, giving the insect a well-marked and distinctive appearance.

That climate is the main factor in the production of this so-called Müllerian combination can be further demonstrated experimentally, for if we take the newly-formed pupa of the Ceylon form of *E. core*, which, as I have said, never has pure white spots on the forewing, and subject it to the same climatic conditions as obtain in the Nilgiris, we can produce a butterfly indistinguishable from certain Nilgiri specimens. Want of material has up to the present prevented me from experimenting with the pupae of the two other species, but I have no doubt they would follow the same lines.

I now turn to the discussion of a Müllerian combination of Danaines (*Amauris*) in South Africa. It is to be found in a paper by Mr. S. A. Neave in our Transactions for 1906, entitled "Some bionomic notes on Butterflies from the Victoria Nyanza," under the sub-heading "Association of *Amauris echeria jacksoni*, Sharp, and *A. albimaculata*,

Butler, with *A. psyttalea*, *f. damoclides*, Staud." Mr. Neave writes as follows: "On examining a large series of both *Amauris echeria* and *A. albimaculata*, which, as Messrs. Rothschild and Jordan have recently pointed out, are clearly distinct species, I was much struck with the difference between the Victoria Nyanza specimens and those from South Africa. The *echeria* specimens have long since been described by Miss Sharp as *A. jacksoni*, a distinct species, but are doubtless not more than a geographical race of *A. echeria*. The *albimaculata* specimens are extremely like if not identical with *A. hanningtoni* of Butler, which is also only a form of *albimaculata*. I shall endeavour to show that both these forms differ from typical South African ones in a common direction, and that these differences are due to the presence of *A. psyttalea*, bringing all three species into a clearly marked synaposematic group." His argument given as briefly as possible is as follows: This resemblance of *E. echeria* and *A. albimaculata* to their model, *A. psyttalea*, is mainly brought about by a gradual enlargement of a spot in the discoidal cell of the forewing, which is at its smallest in specimens south of the Limpopo and gradually increases northwards until in the neighbourhood of the Victoria Nyanza, where the two species come under the influence of the larger-spotted *A. psyttalea* it reaches its maximum development, the three species thus forming a Müllerian combination or synaposematic group. He gives a table of measurements showing the average length and breadth of the discoidal spots in these two species in their various areas of distribution, but as they are so similar it is only necessary to refer to one. I find that in *A. echeria* south of the Limpopo the average length is 2·26 mm. and breadth 1·13 mm., east and north-east of the Victoria Nyanza, where it reaches its maximum, the length is 4·049 mm. and breadth 1·525 mm. It would seem, therefore, that the struggle for existence among these three species, owing to the experimental attacks of young birds, has been so great as to necessitate for their mutual protection an increase in size in the discoidal spot in the forewing of two of these of 1·789 mm. in length and ·395 mm. in breadth. If this should indeed be the case we can agree with Mr. Neave's conclusion that * "this

* This conclusion has been accepted by Professor Poulton, *Essays on Evolution*, p. 335.

clear influence that the presence of one species has had upon two other closely allied ones (all being highly distasteful) seems to be one of the most striking examples of Müllerian mimicry that is possible to imagine."

Before we accept this we may ask, what evidence is there for assuming that these butterflies have differed in any marked manner from their ancestral types? what evidence clear and satisfactory, *i. e.* by observations in the field, has been brought forward to support the view that these butterflies are "highly distasteful"? and what observations have been made in these regions on the tasting habits of young birds? If they have been sufficiently vigorous to cause the enlargement of a spot by the diameter of a pin's head, such should not be entirely unknown to entomologists resident or even travelling through those countries, more particularly when we remember that many insectivorous birds in South Africa nest twice in the year. But these questions are common to every case of Müllerian mimicry, which I do not wish to discuss generally in this paper.

One objection may be raised to Mr. Neave's views, and that is that these spots begin to increase in size in British East Africa, where he tells us the model *A. psyttalea* is not very abundant,* and it is difficult to understand how or why the two abundant butterflies, *echeria* and *albimaculata*, should take as their model one scarcer or not more common than themselves; one would rather suppose the reverse would be the case.

I am inclined to the view that this is an analogous case to that of the *Euplocus*, and that a denser rainfall and hotter climate is the cause of the small spotted and more heavily marked races of these species of *Amauris*. Unfortunately we are not in possession of sufficient meteorological data to enable us to come to a definite decision, and the difficulties are increased by the enormous areas inhabited by these butterflies; but speaking generally the country round the Victoria Nyanza, which is approximately 3,300 ft. above the sea, is hot and humid, and on the west side in proximity to the great forests of the Congo.

Such a climate might well produce the dark hind-

* His actual words are "*A. psyttalea* does not occur in S. Africa, while it is a dominant species in Uganda, and also occurs, but not so commonly, in British East Africa."

winged *A. disa*, *A. hecate*, another presumed model, and its presumed mimic *A. psyttalea*; also the medium spotted *albimaculata* and *echeria* mimics, and on the north-east shore the medium spotted *psyttalea* form, *damoclides*, model. To the east of the Rift Valley in Kikuyu, where *albimaculata* and *echeria* are dominant, the country rises to 6,500 ft. above the sea, and no doubt has a lesser rainfall and is not so hot as Uganda. This I should have expected would produce the larger spotted species; but the spots in these are slightly smaller than those from the Nyanza. But a larger series is much to be desired, as unfortunately Mr. Neave had only eight specimens of the two species for measurement.

Durban, whence come the specimens figured by him, is on the sea-coast, and is hotter and more humid than either Kikuyu or Uganda at certain seasons of the year, and thus we find these species with smaller spots. Climate may also very possibly account for the small-spotted form of *Neptis woodfordi* from the N.E. shore of the Victoria Nyanza and the larger spotted form from Kikuyu, which latter Professor Poulton considers also to have been influenced by the dominant *Amauris* to form a Müllerian combination.

I have but slight personal acquaintance with *A. albimaculata* and *echeria*, but have a very fair knowledge of an allied species, *A. phaedon*. This butterfly occurs in Mauritius commonly, it is peculiar to the island, and being completely isolated from all other *Amauris* there is no question of mimicry, and yet we find in a good series every variation from an unspotted discoidal cell to one with a well-marked spot quite as large as the spots of *A. albimaculata* from the Kikuyu country. If this is the case in a small island only thirty-six miles in diameter, it should teach us caution in drawing conclusions from allied butterflies inhabiting a country about half the size of Europe. I agree with de Nicéville * that in certain groups of *Euploea*, and I would add *Amauris*, there is an inherent tendency to vary or capacity for so doing which is not due to seasonal or climatic causes; but I would go a step further and say that this inherited tendency to vary may be influenced by climate, which, if sufficiently favourable,

* "Notes on a protean Indian butterfly, *E. harrisii*, Felder,' by L. de Nicéville, Trans. Ent. Soc. London, 1892, p. 247.

may cause it to become latent or disappear, and thus produce a geographical race or species.

It has been suggested to me that though the proposition that these mimetic combinations are really little more than climate acting independently on the various allied species is probably correct, yet at the same time I have not disproved that they are mimetic associations.

If this really be so, it seems to me that those who consider that my explanation is inadequate and still maintain that these are all mimetic combinations, should bring forward more evidence than they have hitherto done in support of their contention.

NOTE.—That the blue sheen on the wing of an *Euploea* is produced in any way by climate is a proposition that would not be approved of by Professor Poulton (*Essays on Evolution*, p. 241); to those who have never had the good fortune to see these insects alive and who may wish to be further informed, I may say that in Sikkim and Burma they are found in gloomy forests and thick jungle, and look when in flight as brown butterflies of a uniform tint; it is only when they cross a sunlit patch of forest that one notices the blue flash; in such localities insectivorous birds are rare. *E. mulciber* is not uncommonly found in more open country.

Since writing the above I have obtained the following data, which, however, is far from being all that is needed :—

	Means of		Rainfall	Relative humidity	Wet days
	Max.	Min.			
Durban	80	60	45·57	—	144
Entebbe, 3,906 ft. . .	87·8	59	50·86	81	114
Kikuyu, 6,700 ft. . .	68·8	52	50·67 In 1907 45·64	—	137

XVIII. *Description de quelques espèces nouvelles de* Lucanides *appartenant aux collections du* British Museum.

Par M. Henri Boileau, F.E.S.

[Read February 1st, 1911.]

(Plates XXXIII, XXXIV.)

Au cours d'un déplacement que j'ai eu l'occasion de faire en 1906 en Angleterre, j'ai pu, grâce à l'obligeance de Messieurs C. O. Waterhouse et G. J. Arrow, examiner les nombreux Lucanides faisant partie des riches collections entomologiques du British Museum. Plusieurs espèces qui m'étaient inconnues ayant attiré mon attention, ces messieurs voulurent bien m' autoriser à les emporter pour les examiner à loisir, en me priant en même temps de décrire celles d'entre elles qui me paraitraient nouvelles. Ce travail s'est trouvé retardé, en raison de l'exécution des planches que je désirais joindre aux descriptions. J'aurais voulu, de plus, donner avec celles-ci les nombreuses observations synonymiques et autres que j'avais pu faire, tant au British Museum qu'à Oxford où Mr. Poulton avait très aimablement mis à ma disposition les types si nombreux et si intéressants conservés dans les collections de l'Université. Ce travail n'étant pas suffisamment avancé et quelques-unes des espèces que j'avais entrepris de décrire ayant été récemment reçues à nouveau, je me suis décidé à donner à part les descriptions et figures des espèces nouvelles, que l'on trouvera, en conséquence, ci-après.

I

Description de quelques espèces nouvelles de Lucanides appartenant aux collections du British Museum.

Sphenognathus mandibularis, n. sp.

(Plate XXXIV, fig. 1, ♂.)

♂. Mandibules très longues, presque droites en projection horizontale, très arquées dans le plan vertical. Elles vont d'abord un peu en montant, puis s'inclinent fortement vers le bas. Leur face

externe est arrondie ; leur face interne est plane, bordée par deux carènes denticulées et dentées. La carène supérieure forme, au voisinage immédiat de la tête, une forte dent saillante dirigée en arrière et dont le bord antérieur porte des denticules émoussés. D'autres denticules existent, mais plus effacés et peu visibles, sur toute la longueur de la carène, c'est à dire jusqu' à la pointe recourbée de la mandibule où cette carène se termine. La carène inférieure porte des denticules plus distincts. Au-delà du milieu, elle présente une première dent conique aiguë qui, chez le plus grand des deux types qui représentent l'espèce, est complètement dédoublée sur la mandibule gauche. Un peu plus loin est une seconde dent conique aiguë, plus grande, suivie à peu de distance par une autre beaucoup plus petite. Cette dernière précède immédiatement la pointe terminale qui est recourbée et très aiguë. Les denticules existent jusqu' à la derniére dent, mais non entre celle-ci et la pointe terminale. La face inférieure de la mandibule est formée par une surface peu courbée transversalement, limitée extérieurement par une carène non denticulée, qui disparait à l'endroit où la mandibule après s'être courbée vers le haut s'arrondit pour se cintrer vers le bas.

Le surface des mandibules est irrégulièrement granuleuse; la granulation est plus effacée et l'aspect plus brillant vers l'extrémité qu'à la base.

Tête plutôt large pour le genre. Le bord frontal forme une saillie trapézoïdale, séparée par une légère échancrure des angles latéraux qui se confondent avec les canthus et sont saillants, aigus, et obliquement dirigés vers l'avant. Le contour latéral, d'abord concave, devient convexe au niveau des yeux. Ceux-ci sont entièrement et inégalement divisés par les canthus, les yeux supérieurs étant plus petits et moins saillants que les inférieurs. Le bord frontal est rugueux ainsi que les bords des canthus ; la partie postérieure et médiane de la tête et les parties les plus élevées du bord frontal sont assez lisses. Il existe des soies fines, pâles et assez longues sur les côtés de la tête et autour des yeux.

Le dessous de la tête est plus ponctué que la partie supérieure. Les joues sont ponctuées. Le sous-menton est brillant ; sa ligne de suture avec le menton est presque droite. Le menton a la forme trapézoïdale presque triangulaire, arrondie en avant, habituelle dans ce genre ; il porte, ainsi que le sous-menton, des soies nombreuses longues et pâles.

Les antennes sont assez courtes. Les lamelles du peigne sont fines et peu allongées.

Prothorax de forme générale trapézoïdale avec les côtés latéraux légèrement convexes. Le bord antérieur est régulièrement arrondi

au milieu ; les angles latéraux antérieurs sont obtus mais à sommet vif ; ces angles ont le côté antérieur concave et le côté latéral convexe. Les côtés du prothorax sont convexes, crénelés, l'angle médian est complètement arrondi et la courbure convexe se prolonge en revenant vers le bord postérieur qui est prolongé latéralement par une épine aiguë et simple. Le bord postérieur est légèrement bisinué. La surface du pronotum est fortement bombée et accidentée, grossièrement granuleuse sur le disque et au voisinage des côtés et du bord antérieur; beaucoup plus finement sculptée sur les régions voisines de l'angle postérieur.

Ecusson en segment de cercle, large, court, finement dépoli.

Elytres grandes et larges, portant les plissements irréguliers habituels chez les insectes de ce genre ; leur sculpture rappelle assez celle du *Feisthameli* Guérin, mais est plus serrée. L'aspect est aussi un peu plus brillant. L'angle huméral est arrondi.

Les tibias antérieurs sont armés, sur leur bord externe, de dentelures assez régulières, inclinées vers l' avant, émoussées dans la partie voisine de l'extrémité du tibia. La fourche qui se trouve à cette extrémité est constituée par deux grandes dents, larges à leur base et très aiguës au sommet. De plus, les tibias portent sur leur bord interne une série d'épines droites, fortes, aiguës, assez écartées, disposées sur toute la longueur.

Les tibias médians et postérieurs sont pourvus de plusieurs épines aiguës, inclinées vers l'extrémité, plus fortes sur les tibias médians.

La couleur est un brun rougeâtre foncé, analogue à celui du *Feisthameli* et du *nobilis*, mais sans reflets métalliques irrisés. Les fémurs et les tarses sont notablement plus foncés que les tibias.

Il n'existe que deux mâles, dont un m'a été cédé par le Museum. Leurs dimensions principales sont les suivantes :—

Longueur totale, mandibules incluses	50 à 57·5 mm.
Longueur des mandibules . .	19·2 à 23 „
Largeur maxima aux élytres . .	16 à 18·5 „

L'étiquette de provenance porte les indications :— Colombia : Medellin (*Buckley*).

Sphenognathus giganteus, n. sp.

(Plate XXXIII, fig. 1, ♂ ; fig. 2, ♀.)

Ce bel insecte, remarquable par le développement des grands mâles et par les proportions, relativement plus fortes encore, des femelles, existe dans plusieurs collections. Il est évidemment très voisin du *S. Feisthameli* dont il se rapproche par sa femelle et du *S. Garleppi* auquel son mâle ressemble beaucoup. Il est donc possible qu'il ne

constitue qu'un passage entre les deux espèces et doive plus tard être considéré soit comme les réunissant en une seule, soit comme constituant une simple variété de l'une ou de l'autre.

La description qui suit est basée sur l'examen du spécimen ♂ du British Museum et sur celui de trois femelles dont une m'appartient, mais j'ai vu d'autres exemplaires de cette espèce dans les collections Azambre et R. Oberthür.

♂. Etroitement apparenté au *S. Garleppi* Boileau mais notablement plus grand et présentant plusieurs différences de structure signalées plus loin.

Tête forte pour le genre ; bord frontal légèrement concave (droit chez *Garleppi* et *Feisthameli*) ; canthus bisinués antérieurement et formant une pointe extrêmement aiguë, concaves latéralement ; sculpture de la tête formée par des points enfoncés disposés comme chez *Garleppi*.

Mandibules encore plus longues que chez *Garleppi*, plus amincies à l'extrémité, avec la dent basale de l'arête supérieure beaucoup plus développée. Les denticules de l'arête interne s'avancent plus près de l'extrémité apicale et il n'existe pas de denticule plus fort avant la partie lisse qui forme la pointe longue et aiguë de la mandibule. La double dent basale interne a la forme habituelle, les deux dents de droite étant un peu moins loin de la base que les deux dents de gauche.

Les antennes sont plus fortes, le troisième article plus long, les feuillets du peigne plus développés. Le menton est plus grand, mais est aussi en ogive.

Le prothorax a la même forme que chez *Garleppi*, les angles latéraux antérieurs sont un peu plus arrondis et les postérieurs ont une épine plus robuste et moins aiguë. La sculpture est du même genre chez les deux insectes, mais plus rugueuse pour *giganteus* où elle devient extrêmement forte et grossière sur le disque.

L'écusson est plus arrondi à la pointe et plus voisin de l'arc de cercle du *Feisthameli* que de l'ogive du *Garleppi*.

Les élytres ont sensiblement même forme et sculpture pour les deux espèces, leur surface est finement granuleuse avec des plissements transversaux bien marqués, et des stries transversales serrées le long de la suture.

Les angles huméraux sont épineux chez les deux mâles, mais l'épine du *Garleppi* est plus grêle et dirigée un peu en arrière. Celle du *giganteus* se raccorde davantage avec l'élytre en arrière, elle est plus robuste et plus normale à l'axe longitudinal.

Les tibias, très longs, sont plus lisses et moins ponctués que chez *Garleppi*. Les épines externes sont plus espacées ; les épines internes, très développées chez *Garleppi*, sont plus rares et à peine saillantes pour la plupart chez *giganteus*. Les épines des tibias médians et postérieurs sont plus longues, mais plutôt moins nombreuses. La couleur est plus foncée, d'un brun plus sombre, avec des reflets d'un vert noir ; les pattes sont entièrement métalliques.

Les soies, de couleur pâle, sont aussi abondantes que chez *Garleppi*.

Les dimensions principales sont :—

Longueur totale, mandibules incluses . .	66·5 mm.
Longueur des mandibules	24·7 ,,
Largeur maxima de la tête	13·0 ,,
Largeur aux élytres	19·5 ,,

L'étiquette de provenance porte les indications :— Bolivia, Chulumani, 2000 m. (*P. O. Simons*) 1901. 324.

♀. Les deux femelles du British Museum ne sont pas absolument semblables et sont de provenances différentes. La plus caractérisée porte la même étiquette d'origine que le mâle, l'autre vient de l'Equateur comme la femelle de ma collection dont elle se rapproche beaucoup comme forme.

La différence de taille entre ces femelles et celles des *S. Feisthameli* et *Garleppi* est beaucoup plus considérable que celle qui existe entre les mâles. La tête est fortement ponctuée ; le bord frontal sensiblement droit ou même un peu convexe (exemplaire de Chulumani). Les angles latéraux antérieurs se prolongent par une pointe aiguë très développée à peine indiquée chez *Feisthameli* et *Garleppi*. Le canthus se raccorde à cette pointe par une courbe concave antérieurement et convexe postérieurement ; il est plus étroit que chez *Garleppi* et plus régulièrement convexe en arrière que chez *Feisthameli*.

Les mandibules sont remarquablement développées, notamment plus fortes et plus longues que chez *Feisthameli* ; mais de même forme. Elles présentent, vers la moitié de leur longueur, une dent externe qui existe chez *Feisthameli* mais est très émoussée ou arrondie chez *Garleppi*.

Le prothorax, plus étroit en avant que chez *Garleppi* a sensiblement même forme que chez *Feisthameli* ; il est granuleux, sauf sur la région médiane. Les angles latéraux antérieurs sont arrondis ; l'angle médian est apparent mais non épineux ; les angles postérieurs sont arrondis ; les côtés latéraux sont droits ou concaves comme chez *Feisthameli* et non convexes comme chez *Garleppi*.

La sculpture du prothorax est plus ou moins prononcée suivant les individus. La femelle de Chulumani est la plus granuleuse, la région centrale du disque étant elle-même ponctuée. L'exemplaire que je possède est un peu plus lisse ; celui qui provient de l'Equateur, au British Museum, est peu ponctué et présente sur la partie postérieure du disque une région lisse étendue.

L'écusson presque en demi-cercle ou ogival très obtus, est assez finement ponctué.

Les élytres plus ou moins plissées, granuleuses et assez brillantes sont un peu plus atténuées en arrière que chez *Feisthameli* et *Garleppi*.

Les tibias et les fémurs sont ponctués. Les tibias antérieurs, côté gauche, sont armés de quatre fortes dents de grandeur décroissante depuis l'extrémité et d'une cinquième sensiblement plus petite. Parfois il existe, comme chez le deuxième exemplaire du Museum (provenant de l'Equateur), les traces d'une sixième dent. Les tibias antérieurs de droite ont une dent de moins.

Les tibias intermédiaires portent trois épines aiguës, bien développées, parfois une de plus à gauche, ou une de moins à droite. Il en est de même pour les postérieurs dont les épines sont cependant beaucoup plus courtes.

La couleur est assez variable et parait être, en général, un brun roux sombre, plus ou moins cuivreux, souvent avec des reflets métalliques verts. Le bord externe des élytres et la région voisine, le bord du prothorax, les côtés de la tête sont aussi pourvus de reflets verts et cette teinte peut même s'étendre sur presque toute la surface comme chez l'exemplaire de Chulumani ici figuré.

Les fémurs sont de couleur métallique verte ou cuivreuse ; les tibias plus ou moins roux-noirâtres.

Les exemplaires frais paraissent devoir être aussi fortement revêtus de soies que ceux du *Garleppi*, mais le revêtement supérieur tombe aisément et les deux exemplaires du British Museum n'en portent aucune trace.

Les dimensions principales sont :—

Longueur totale, mandibules incluses .	48·2 à 50 mm.
Longueur des mandibules . . .	7·2 à 7·3 „
Largeur aux élytres	28·2 à 28·3 „

Lucanus Fryi, n. sp.

(Plate XXXIV, fig. 3, ♂ major ; fig. 4, ♂ minor.)

Cette espèce, des plus remarquables, parait avoir été confondue dans la collection Fry d'où elle provient avec

le *L. Westermanni*, Hope.* Elle présente avec celui-ci des affinités évidentes mais elle en diffère notablement et se rapproche davantage du *L. singularis*, Planet. L'espèce est représentée par un mâle qui parait être du plus grand développement, par un autre mâle de forme mineure, et par une femelle, malheureusement déformée par un accident de nymphose. Les étiquettes indiquent que les trois spécimens proviennent de Burmah, Ruby Mines, et ont été pris par W. Doherty.

♂. Insecte de forme robuste, se rapprochant assez comme proportions générales du *macrdifemoratus*, var. *Hopei*, Parry. Comparé au *singularis*, il parait plus large et plus vigoureux ; la tête surtout est plus forte, les mandibules sont moins longues, moins courbées, presque dépourvues de denticules, mais il est évident que les deux espèces sont étroitement apparentées, le *L. Fryi* paraissant cependant former passage entre le *L. singularis* et le *L. Westermanni*, comme le montre surtout l'examen du petit mâle et de la femelle.

Tête transversale, presque plane, avec l'arête frontale arquée relevée en carène saillante. Les angles antérieurs sont tronqués. Les carènes latérales décrivent une courbe réguliere, d'abord concave extérieurement, puis largement convexe. La partie supérieure de la tête qui se trouve limitée par la carène frontale et les carènes latérales offre le contour postérieur bilobé très fréquent chez les Lucanes vrais. Les angles postérieurs de ces lobes sont à peu près droits et les carènes s'atténuent après les avoir atteints puis s'effacent avant d'arriver à l'angle médian rentrant formé par la rencontre des côtés internes des lobes.

Le bord frontal est incliné, disposé comme chez *singularis*, mais plus faiblement renflé et plus horizontal. Il forme à son extrémité une saillie légèrement divisée, un peu relevée vers le haut, analogue à celle des *L. lunifer* (Hope), *Planeti* (Planet), et *singularis*, mais moins fourchue. La partie antérieure de cette protubérance est légèrement convexe vue de profil, elle est plus verticale que chez *lunifer* et *singularis* et aboutit à une saillie conique, normale à la surface inclinée, qui existe également chez les trois espèces citées plus haut. Cette pointe couvre la bouche, elle forme la contre-partie du menton

* Le plus grand mâle porte une étiquette avec la note suivante : "These four preceding Lucanidae appear to me to be one large and two (?) small ♂ and one ♀ *Lucanus Westermanni* of Hope. No. 39695 were named by Major Parry as *Lucanus Westermanni* of Hope, which I believe to be right." Je n'ai pu retrouver le spécimen portant le No. 39695 mentionné par cette note.

et constitue la lèvre supérieure. La région antérieure de la protubérance qui est formée, chez *singularis*, par une surface lisse bordée de chaque côté par une carène, présente ici deux sillons peu profonds mais bien visibles séparés par une côte assez large, elle même légèrement déprimée sur son axe. Le tout est ponctué et rugueux.

Les yeux, entaillés au tiers par les canthus, sont saillants et plus gros que chez *singularis*.

Les antennes sont assez longues ; les lamelles du peigne sont étroites ; celle du septième article. terminée en pointe et brillante sur sa surface postérieure, est presque aussi longue que les autres.

Les mandibules sont à la fois plus courtes et moins inclinées que chez *singularis* ; elles sont armées, comme dans cette espèce, d'une dent, de grandeur médiocre, placée au-delà du milieu, et se terminent par une fourche qui est beaucoup moins grande et moins ouverte chez *Fryi*. La branche externe de la fourche est aplatie et affecte la forme tronquée que l'on observe assez souvent chez *Mearesi*, Hope, et *lunifer*. Les denticules qui existent chez *singularis* a la base des mandibules, avant la dent médiane et entre celle-ci et la fourche, font défaut à la base et sont à peine visibles sur les deux autres régions. Sous la mandibule, au quart de sa longueur à partir de la base existe une petite dent, moins développée que chez *singularis*. Le prothorax est plus large chez *Fryi* ; les angles latéraux antérieurs sont plus arrondis, l'angle latéral plus ouvert ; la surface, finement granuleuse, assez brillante sur le disque, est plus lisse.

L'écusson est semi-circulaire.

Les élytres, coupées droit à la base sont un peu plus courtes et plus larges que chez *singularis* ; l'angle huméral, marqué par un petit tubercule, n'est pas arrondi ; la surface, régulièrement courbée est plus lisse chez *Fryi*.

En dessous, le menton est un peu plus large, le prosternum plus comprimé latéralement et plus saillant en arrière que chez *singularis* ; il forme une protubérance demi-circulaire.

Les pattes sont finement granuleuses ; les tibias antérieurs, légèrement convexes vers le haut, sont armés d'une fourche terminale formée par deux petites dents; il existe de plus trois dents à peu près égales, écartées, et deux autres, moins fortes vers l'articulation fémorale. Le dernier article des tarses est aussi long que les quatre qui le précèdent, pris ensemble.

Les tibias médians portent, outre les épines terminales, trois fortes épines latérales et une quatrième plus faible. Les deux épines les plus voisines de l'articulation fémorale sont plus petites que les suivantes et sont très rapprochées l'une de l'autre. Les tibias postérieurs présentent la même armature, mais les épines sont

beaucoup plus faibles et moins aiguës. Ces épines sont, d'une manière générale, plus développées chez *singularis*.

La description qui précède s'applique plus spécialement au grand mâle. Le petit mâle qui appartient à la forme mineure se rapproche passablement comme aspect général et proportions d'un *L. Westermanni*. La tête est plane, courte, avec les carènes latérales bien marquées, la carène frontale effacée, la saillie de l'épistome fourchue, bien développée, simplement granuleuse sur sa face triangulaire antérieure. Les mandibules sont longues et grêles ; la dent médiane à peine marquée ; la fourche terminale est rendue inégale par réduction de la dent interne ; les denticules sont peu marqués mais aussi visibles que chez le grand mâle, toutefois ceux qui précèdent la dent médiane sont réduits à un ou deux seulement. La dent inférieure subsiste, sous forme d'un très petit denticule.

L'armature des tibias est la même que pour le grand mâle, cependant la première et plus petite épine manque aux tibias médian et postérieur du côté gauche.

La granulation est très analogue chez les deux exemplaires et rappelle beaucoup celle du *Westermanni*.

Femelle. La femelle est malheureusement difforme ; elle a subi un accident de nymphose qui a entraîné une grave altération des formes de la tête et des pattes antérieures. Les pattes médianes sont elles-mêmes un peu modifiées.

Tout ce qu'on peut dire au point de vue de la description de l'espèce, en jugeant d'après un exemplaire aussi anormal, c'est que cet insecte semble différer davantage de la femelle du *singularis* que les mâles des deux espèces. Comparée à la femelle (type) du *L. singularis* elle en diffère principalement par la grande largeur de son prothorax, non rétréci en avant et dont l'angle latéral très ouvert n'a pas son sommet presque épineux comme chez *singularis*.

Les mandibules portent une double dent médiane. Les tibias antérieurs sont armés de trois dents en plus de la fourche terminale. Les tibias médians et postérieurs ont trois épines de grandeur décroissante vers l'articulation fémorale.

Les trois spécimens sont d'un brun roux, tirant sur le noir seulement chez le grand mâle. La partie inférieure, noirâtre chez celui-ci et la femelle, est rousse chez le petit mâle. Les pattes sont rousses chez cet exemplaire et la femelle, noirâtres chez le grand mâle. La pilosité, presque nulle à la partie supérieure est assez développée en dessous, tout en étant beaucoup moindre que chez les *singularis* de Yunnan-Sen. Il est d'ailleurs probable que les trois spécimens ne sont pas très frais.

Les dimensions principales sont respectivement les suivantes pour les deux mâles et la femelle :—

Longueur totale, mandibules incluses : mm. 69·5 ; 43·8 ; 33·5.
Longueur des mandibules : mm. 25·2 ; 14·3 ; 4·0.
Largeur de la tête : mm. 20·5 ; 12·7 ; 9·0.
Largeur maxima aux élytres : mm. 21·0 ; 15·2 ; 16·5.

Lucanus Dohertyi, n. sp.

(*Lucanus laminifer*, Waterhouse, var.)

(Plate XXXIV, fig. 2.)

Cette espèce n'est représentée dans la collection que par un seul mâle, de développement moyen, portant les étiquettes suivantes: Assam: Naga Hills (*Doherty*).—*Lucanus laminiferus* (var. *minor*), Waterhouse type.—Fry Coll. 1905, 100.—Au moment ou Mr. Waterhouse décrivait son *L. laminifer* les spécimens de forme majeure de cette espèce étaient seuls connus et l'erreur de détermination faite sur l'insecte de la collection Fry's explique facilement si l'on tient compte des variations considérables maintes fois constatées de ce groupe. Actuellement il est de toute évidence que le spécimen dont la description suit, appartient à une espèce distincte, beaucoup plus voisine du *L. Westermanni*, Hope, que du *L. laminifer*, Waterhouse.

Comme apparence générale, ce lucane rappelle beaucoup certains exemplaires du *L. Westermanni* dont il possède la forme courte et robuste.

La tête est à peu près rectangulaire si l'on fait abstraction de la saillie des yeux et de l'épistome. Le bord antérieur est concave, l'arête frontale se relève au milieu et forme une crête arrondie bien apparente, probablement beaucoup plus forte chez les exemplaires de développement majeur. Cette carène frontale est bien différente de la saillie isolée du *laminifer* et ressemble assez à celle du *cervus*.

L'épistome a une forme ogivale aiguë, un peu acuminée à la pointe ; sa surface est presque plane et les petites carènes latérales qui existent chez *Westermanni* font ici défaut.

Les angles latéraux antérieurs sont tronqués un peu obliquement et comme l'extrémité de l'arête antérieure des canthus oculaires est elle-même saillante, ils présentent trois petites saillies anguleuses distinctes.

Les canthus sont faibles, linéaires, aigus en arrière et n'atteignent pas la moitié de l'œil. Les carènes céphaliques sont bien marquées,

mais non relevées, la surface supérieure de la tête étant sensiblement plane. Ces carènes sont arrondies postérieurement et s'effacent en s'abaissant un peu en arrière, formant un contour un peu plus concave extérieurement que le bord frontal.

Le menton est notablement plus large que chez *Westermanni*.

Les antennes sont plus massives; leur quatrième article est plus long que le cinquième, contrairement à ce que l'on observe chez *Westermanni* ; le peigne a ses lamelles moins découpées, son premier article (7e de l'antenne), qui est épineux, forme une saillie plus forte que les lamelles des autres articles pectinés.

Les mandibules sont plus courtes et plus granuleuses que celles d'un *L. Westermanni* de même taille et leur forme est assez différente Elles présentent extérieurement une courbure en arc de cercle et se terminent par une fourche peu développée, dont la dent supérieure, légèrement relevée, dépasse sensiblement l'inférieure. Il existe une dent médiane analogue à celle du *Westermanni*, mais placée un peu plus loin de la base et, entre cette dent et la fourche terminale, une petite dent intermédiaire. De plus, sur la mandibule droite, on distingue deux très petits denticules précédant immédiatement la dent médiane à partir de la base.

Le prothorax est notablement plus large que chez *Westermanni* : l'angle médian du bord antérieur est obtus ; les angles latéraux antérieurs tout en étant aigus, sont plus larges chez *Dohertyi* ; les côtés sont légèrement convexes avant l'angle médian et à peine concaves après cet angle ; les angles postérieurs sont arrondis. La surface supérieure est bombée, finement granuleuse, assez brillante, couverte de points serrés, probablement villeuse à l'état frais. Le milieu du bord antérieur est remarquablement lisse et brillant.

En dessous, la saillie du prosternum est très obtuse et peu marquée ; la surface est couverte de soies courtes.

L'écusson est large, ogival obtus, granuleux et ponctué.

Les élytres sont longues, plus développées que chez *Westermanni*, égales chez le type au reste du corps, mandibules incluses. Elles sont assez longuement parallèles, arrondies ensemble à l'extrémité, assez brillantes ; la base est coupée droit, l'angle huméral bien marqué mais non épineux.

En dessous les segments thoraciques sont fortement soyeux, les segments abdominaux sont glabres. Les pattes sont robustes, concolores, rougeâtres ; les tibias antérieurs ont une fourche terminale très avancée mais peu bifurquée. Les dents du bord externe sont au nombre de trois sur le tibia de droite et de quatre sur celui de gauche. Il existe, à droite seulement, des denticules serrés formant arête crénelée entre les dents principales. Les tibias médians ont trois fortes épines et une plus petite voisine de l'articulation

fémorale ; les tibias postérieurs ont une forte épine de moins que les médians.

La couleur est un brun noir, plus rougeâtre sur les élytres, les mandibules, les pattes et les segments abdominaux que sur le reste du corps, qui est noirâtre.

Les dimensions principales sont :—

Longueur totale, mandibules incluses . .	47	mm.
Longueur des mandibules	11	,,
Largeur de la tête	13·4	,,
Largeur maxima aux élytres	16	,,

Cette espèce est dédiée à Mr. Doherty, qui l'a découverte, ainsi que beaucoup d'autres des plus remarquables.

Rhaetulus speciosus, n. sp.

(Plate XXXIII, fig. 3, and Plate XXXIV, fig. 5.)

Espèce bicolore, très distincte et fort belle, représentée par un seul mâle de grand développement.

L'étiquette de provenance porte l'indication : Siam, 1901, 231.

Tête relativement petite, très transversale, légèrement concave ; bord antérieur incliné, sans arête frontale définie, se continuant par l'épistome qui forme une saillie intermandibulaire pentagonale très développée dont les trois angles antérieurs sont bien marqués et même épineux.

Les angles latéraux antérieurs de la tête sont arrondis, les canthus, assez forts, à peine légèrement convexes, entaillent à demi les yeux qui sont bombés et plus développés sur la face inférieure. La tête est fortement rétrécie en arrière.

Antennes assez courtes, ayant le scape sensiblement égal au fouet. Les quatre premiers articles de celui-ci sont à peu près égaux ; le suivant (6e de l'antenne), est un peu plus court, légèrement élargi à l'extrémité ; le septième est pourvu d'un éperon assez faible ; le huitième est spongieux sauf sur une étroite bande dorsale, le neuvième et le dixième sont entièrement spongieux. Le peigne formé par ces trois derniers articles et par celui qui précède est constitué par trois lamelles assez larges et bien développées et par l'éperon du septième article.

Menton très développé, légèrement trapézoïdal, avec les angles antérieurs fortement arrondis et le bord libre courbé en arc vers le bas ; sa surface est très régulièrement granuleuse.

Mandibules contournées, très longues, grêles et anguleuses, de forme compliquée. Vues en plan elles se dirigent d'abord à l'extérieur,

puis se coudent, deviennent presque droites et parallèles et se terminent par une longue fourche dont les pointes aiguës sont dirigées vers l'intérieur. Vues de côté, elles forment une courbe convexe vers le haut, d'abord un peu ascendante puis fortement descendante. Chaque mandibule présente une carène principale qui part, à la base, de la partie supérieure, et forme ensuite l'arête latérale interne. Cette carène porte une forte dent verticale basale, simple et aiguë, puis, après un petit intervalle inerme, une dizaine de petits denticules coniques, bien formés, de grandeur légèrement décroissante, suivis par une dent moyenne, très aiguë, légèrement tournée en avant et qui se trouve placée à peu près aux deux tiers de la longueur totale. Après cette dent se trouvent des denticules coniques, réguliers, un peu croissants, au nombre de six ou sept, existant sur toute la longueur qui sépare la dent médiane de la première branche de la fourche apicale. Cette branche est extrêmement développée, conique, très aiguë et forme un véritable poignard. L'autre branche de la fourche est de même longueur, également grêle, mais pourvue sur son côté interne d'une carène de renfort à laquelle succèdent, en revenant vers la base de la mandibule, une série de denticules aigus, tout aussi développés que ceux de la carène supérieure et au nombre de quinze ou seize environ. Après ces denticules, la carène s'atténue, puis reparait, et revient, par une courbe convexe extérieurement, vers l'intérieur des mandibules, de façon à former leur contour apparent à la base, en projection horizontale. Enfin le bord arrondi qui constitue, sur les deux tiers environ à partir de la pointe, le contour apparent externe, se transforme en carène vers le quart de la longueur à partir de la base, et se projette vers le bas en formant une dent aiguë sur l'arête externe de laquelle se voient quatre petits denticules. Ce système de mandibules est un des plus compliqués que l'on rencontre chez les Lucanides.

Toute la surface de la tête et des mandibules sauf la fourche terminale, est régulièrement et finement granuleuse.

Le prothorax est notablement plus large que la tête. Le bord antérieur est peu sinueux, son angle médian étant très arrondi, et ses angles latéraux peu saillants et peu aigus sans être cependant véritablement arrondis. Les côtés sont régulièrement convexes et denticulés jusqu' à leur angle médian, ensuite un peu tronqués et légèrement sinueux jusqu' à l' angle postérieur qui est entièrement arrondi. Le bord postérieur est faiblement sinueux et, dans son ensemble, un peu concave.

La surface supérieure fortement et régulièrement bombée, est très finement et uniformément granuleuse.

En dessous, le prosternum forme une très faible protubérance arrondie en arrière.

Les élytres sont très longues, presque parallèles, puis régulièrement atténuées vers leur extrémité. La base est légèrement convexe ; l'angle huméral très faiblement épineux, la marge externe assez large. La surface est finement granuleuse, plus lisse et brillante vers la suture. Les pattes, de longueur moyenne, sont assez fines. Les tibias antérieurs portent des épines aiguës, écartées, de grandeur croissante jusqu' à la fourche, qui est saillante mais formée par des dents assez courtes. Il y a huit ou neuf épines ou denticules avant la fourche. Les tibias médians portent une forte épine grêle, très aiguë, un peu au-delà du milieu. Les postérieurs ont une épine plus petite placée de même.

Les tarses sont un peu plus courts que les tibias ; leur article terminal est presque aussi long que les quatre qui le précèdent, pris ensemble. Ceux-ci ne portent des soies, à leur partie inférieure, que sur une zone triangulaire peu étendue voisine de l' extrémité de chacun d'eux. Les soies sont rousses, serrées et courtes.

La couleur est un beau brun rougeâtre clair, nuancé de brun plus foncé et passant au brun noir ou au noir sur le contour latéral de la tête, les mandibules, les antennes, le disque du pronotum, les angles médians de celui-ci, la base, la suture et les marges externes des élytres. La partie inférieure du corps est plus sombre. Seuls le menton, nuancé de brun rouge, les côtés du métasternum marqués chacun d'une large tache brune, et les fémurs, dont la plus grande partie est rougeâtre, tranchent sur la teinte, d'un brun tirant plus ou moins sur le noir, qui revêt les autres parties.

Les dimensions principales sont :—

Longueur totale, mandibules incluses . .	48 mm.
Longueur des mandibules . . .	16 „
Largeur de la tête	13 „
Largeur maxima, au prothorax . . .	15 „

Hemisodorcus rufus, n. sp.

Les *Hemisodorcus elegantulus*, Albers, et *axis*, Boileau, très distincts par la forme du prothorax, ont tous deux les élytres largement marquées de noir sur la suture et les marges latérales. Dans les collections du British Museum se trouve un mâle, provenant de la collection Fry et récolté à Perak, qui paraît appartenir à une espèce intermédiaire. Ce spécimen se rapproche davantage, comme structure, d'*elegantulus* dont il se distingue par plusieurs caractères ; il diffère d'ailleurs d'*axis* et d'*elegantulus* par sa coloration claire, les élytres étant d'un brun roux avec une ligne noire sur la suture, et les marges

latérales n'étant ni rembrunies, ni même bordées de noir. Le mâle, décrit ci-après, me semble de développement moyen. Il est un peu plus grand que les mâles d'*elegantulus* qui présentent le même forme mandibulaire.

La tête diffère très peu de celle d'*elegantulus*, cependant l'épistome est coupé tout à fait droit ; les canthus sont un peu plus obliques et la saillie des joues derrière les yeux légèrement plus prononcée. Les mandibules sont construites sur le même type, mais semblent un peu plus longues. De plus, la dent principale qui, chez les exemplaires de même développement des *H. axis* et *elegantulus* est constituée par deux denticules divergents précédés, du côté de l'apex, par un denticule assez faible chez *elegantulus* et presque complètement effacé chez *axis*, est ici formée par trois denticules précédés par un quatrième, sur la courbure apicale, aussi distinct que le denticule correspondant chez *elegantulus*.

La prothorax ressemble beaucoup, comme contour, à celui d'*elegantulus* mais forme passage à celui d'*axis*. Les angles latéraux antérieurs sont plus longs que chez ce dernier, mais ne présentent pas, du côté externe, la courbure concave si spéciale que l'on voit chez *elegantulus*. La deuxième courbure concave qui existe, chez les deux espèces déjà connues immédiatement avant l'angle postérieur, est moins prononcée chez la nouvelle espèce. Il en résulte que le contour latéral du prothorax, tout en étant bien plus complexe que chez *axis*, où il est réduit à une courbe presque régulièrement convexe, est cependant moins sinueux que chez *elegantulus*. Comme chez *axis* et *elegantulus*, la largeur du prothorax est notablement supérieure à celle des élytres.

L'écusson, en demi-cercle, est ponctué.

Les élytres, très longues, sont parallèles, puis atténuées en courbe ogivale à sommet légèrement arrondi. Les épaules sont anguleuses comme dans les deux autres espèces.

En dessous le menton est velu, de forme rectangulaire avec les angles antérieurs largement arrondis ; il est un peu moins large que chez *axis*. Chez *elegantulus* le contour est nettement trapézoïdal.

Les tibias antérieurs sont dentés en scie très serrée, comme chez *elegantulus*, mais avec des denticules plus obliques. Chez ces deux espèces il existe quatre ou cinq denticules un peu plus saillants dont la grandeur va en décroissant vers l'articulation fémorale.

Les tibias intermédiaires laissent deviner un rudiment d'épine un peu au-delà du milieu ; les tibias postérieurs sont tout à fait inermes.

Comme pour les autres espèces, les tarses, sensiblement égaux aux tibias, ont leurs quatre premiers articles pourvus de soies serrées, de longueur croissante vers l'extrémité des articles.

La couleur générale est un roux brun, un peu plus clair que chez *elegantulus*. La pointe des mandibules, les antennes, les tarses, les extrémités des fémurs et les denticules des tibias antérieurs sont fortement rembrunis. Le pronotum est bordé de noir. L'écusson, la zone médiane du sternum et la suture des élytres sur une faible largeur, sont rembrunis. Il existe des macules sombres sur les bosses anté-oculaires et au voisinage des angles postérieurs du prothorax.

Les dimensions principales sont :—

Longueur totale, mandibules incluses	22	mm.
Longueur des mandibules	4·8	„
Largeur maxima au prothorax	7·5	„

Hemisodorcus Arrowi, n. sp.

Le British Museum possède un exemplaire unique de cette espèce, évidemment très rapprochée du *rubrofemoratus*, Vollenhoven. Ce spécimen est un mâle de forme majeure et de grande taille, provenant de la collection Fry. Il porte les étiquettes : 60876—Doherty.—Burmah.—Ruby Mines.

La tête est, dans son ensemble, plus trapézoïdale que chez *rubrofemoratus*, les joues n'étant pas renflées derrière les yeux. Le bord frontal est un peu plus concave ; l'épistome, sensiblement de même grandeur porte une petite saillie au milieu de sa marge antérieure, au lieu d'être régulièrement concave. Les canthus oculaires sont anguleux en avant et légèrement concaves latéralement au lieu d'être arrondis et convexes comme chez *rubrofemoratus*. Le menton est un peu plus court, plus trapézoïdal, moins granuleux, et porte un plus petit nombre de points cicatriciels chez *Arrowi*.

Les antennes ne diffèrent que par leur développement, plus fort chez *Arrowi* ; le peigne et le fouet, notamment ont leurs articles plus allongés, les lamelles du peigne sont d'une forme moins carrée.

Les mandibules sont presque semblables dans les deux espèces, et ne diffèrent que par quelques détails. Leur surface supérieure est plus aplanie chez *Arrowi* ; la dent principale est précédée par une courbe arrondie et ne forme pas l'angle brusque que l'on voit chez *rubrofemoratus*, cette dent est plus tranchante sur son bord postérieur et celui-ci porte quelques denticules mal définis, mais très appréciables, qui manquent totalement chez l'espèce ancienne. La surface des mandibules est aussi plus brillante en dessus et surtout latérale-

ment ; elle est moins dépolie en dessous. Enfin la granulation régulière de la tête est également plus fine.

Le prothorax a la même forme générale chez les deux espèces, mais les côtés sont moins sinueux avant la deuxième dent chez *Arrowi*, la première dent latérale est un peu plus faible ; par contre la deuxième dent (qui représente l'angle médian habituel) est plus prononcée et forme une épine, qui est suivie par une courbe concave plus forte aboutissant à l'angle postérieur. Celui-ci est aussi mieux marqué chez *Arrowi*.

La marge antérieure présente, chez cette espèce, une saillie médiane un peu plus aiguë et plus prononcée que chez *rubrofemoratus*, mais ici cet angle n'est pas rebordé, la bordure n'existant réellement que sur les deux tiers de la marge, de chaque côté, à partir de l'angle latéral antérieur.

En dessous, le prosternum est sensiblement plus large entre les hanches chez *Arrowi* ; il forme en arrière une saillie assez marquée, dont le bord postérieur vu de profil est concave vers l'arrière ; chez *rubrofemoratus* la saillie est presque nulle et son bord postérieur est convexe.

La surface du pronotum est presque brillante sur le disque, et très finement dépolie latéralement, au lieu d'être entièrement dépolie comme chez *rubrofemoratus*.

L'écusson est ogival, brillant, à peine ponctué à la base.

Les élytres sont notablement plus longues chez *Arrowi* ; leur forme est la même que chez *rubrofemoratus*, mais les angles huméraux sont plus épineux. Il y a peu de différences dans le métasternum et les segments abdominaux ; toutefois le métasternum porte, en arrière, chez *rubrofemoratus*, une ligne médiane longitudinale enfoncée qui n'existe pas ici.

Les pattes sont à peu près pareilles cependant sur les tibias antérieurs, les petits denticules écartés, qui forment l'armature du bord externe, sont moins nombreux, et commencent plus loin de l'articulation fémorale chez *Arrowi*. La surface des pattes est aussi plus lisse et plus brillante. La coloration des deux espèces est différente. Les élytres sont d'un rouge brun foncé chez *Arrowi* et les côtés du prothorax présentent aussi une nuance rougeâtre. Les pattes, le métathorax et les segments abdominaux sont d'un brun rouge foncé ; la tête, la plus grande partie du prothorax, les mandibules, les antennes et les tarses sont noirs.

Les dimensions principales sont :—

Longueur totale, mandibules incluses . .	47·8 mm.
Longueur des mandibules	13·2 „
Longueur des élytres	21·3 „
Largeur maxima, au prothorax . . .	14·4 „

Gnaphaloryx Ericsoni, n. sp.

Cette espèce, qui appartient au groupe de *squalidus*, Hope, est représentée, dans les collections du British Museum, par un seul mâle. Celui-ci porte les indications : Sétinjak 1800 ft. jan., et sur une autre étiquette : Philippines, Ericson.

Ce dernier renseignement est, selon toutes probabilités, erroné. M. G. Arrow m'a informé, en effet, qu'il ne semble pas que M. Ericson ait été aux Philippines et que les insectes de ses chasses proviennent tous de Sumatra.

Il est dès-lors admissible que Sétinjak est une localité peu connue de cette dernière île. Ce qui rend l'hypothèse de M. Arrow tout à fait vraisemblable, c'est que le *G. Ericsoni* existe certainement à Sumatra. Je possède deux femelles de Médan, qui m'avaient bien parues se rapporter au mâle de Sétinjak, lorsque je l'ai eu en communication et j'ai trouvé depuis dans la collection de Lucanides qui m'a été cédée par M. Van de Poll, une intéressante série de 4 mâles et 3 femelles, étiquetés "Tandjong Djati, Ranau Palembang. + 2000. Meigo I.Z. Kannegieter" que je ne puis rapporter qu'à cette espèce. Les descriptions suivantes sont basées sur l'étude de ces divers spécimens.

♂. Tête forte, bombée sur le disque, et présentant, sur le milieu du bord frontal, une corne rudimentaire sous forme d'un petit tubercule conique peu apparent. Bord frontal concave ; angles antérieurs arrondis ; canthus régulièrement arrondis surs les côtés, divisant entièrement les yeux. Saillie des joues en arrière des yeux très forte, dépassant la saillie des canthus et nettement arrondie. L'épistome formant la lèvre supérieure, est rectangulaire ou un peu concave en avant.

Mandibules très dissymétriques. Comme d'habitude dans cette section du genre, la mandibule gauche est plus longue et plus cintrée que la mandibule droite dont elle diffère également par l'armature. La mandibule gauche est très régulièrement courbée sur son bord externe ; elle porte à la base une double dent assez large dont la partie la plus éloignée de la tête est la plus saillante. Après cette dent existe une courbe concave vers le milieu ou avant le milieu de laquelle se trouve un très petit denticule ; cette courbe aboutit à une dent plus forte. Au-delà, la mandibule s'amincit beaucoup et forme une pointe terminale une peu émoussée, précédée par une petite saillie arrondie placée sur la carène externe, qui se relève à cet endroit.

La mandibule droite est armée, elle aussi, à la base, d'une sorte de carène formée par la réunion de deux dents, mais celles-ci sont plus écartées, de sorte que la carène est plus longue et que la deuxième dent se trouve au-delà du milieu du bord interne. Cette deuxième dent est égale à l'autre ou plus forte ; elle est placée en face du petit denticule de la mandibule gauche. Au-delà se trouvent, très près les uns les autres, un denticule et une dent un peu plus forte, qui correspondent à ceux de la mandibule gauche, mais sont autrement placés, puis la pointe apicale aiguë, qui forme fourche avec une dent supérieure constituée, comme à gauche, par la carène externe, mais qui est ici bien plus développée et conique. La fourche ainsi formée, emboîte et arrête la pointe de la mandibule gauche qui, au repos, s'engage entres ses branches.

Les antennes sont courtes ; le scape légèrement plus long que le fouet ; les articles de celui-ci sont plus courts et plus larges que chez *squalidus* ; le peigne, formé par les trois articles terminaux, a son premier article un peu plus large que les deux suivants.

Le prothorax a son bord antérieur formé par deux courbes légèrement concaves vers l'avant. L'angle médian du bord antérieur, très obtus, n'est pas atténué. Les angles latéraux antérieurs sont formés par une ligne droite, normale à l'axe longitudinal et par le côté, qui est également en ligne droite. Le sommet de l'angle ainsi constitué est un peu arrondi. Les côtés sont divergents en avant, depuis l'angle latéral médian, qui est bien marqué ; derrière cet angle ils sont concaves extérieurement et aboutissent à l'angle postérieur, assez arrondi. Le bord postérieur est bisinué.

La surface supérieure n'est pas régulièrement bombée, mais présente, de chaque côté de l'axe longitudinal, un groupe de trois dépressions circulaires, à peu près égales, disposées en triangle isocèle, la base en avant. L'axe du groupe est sensiblement à mi-distance de l'axe de symétrie longitudinale et du bord du prothorax. Ecusson en ogive équilatère.

Elytres ayant la longueur du prothorax, de la tête et des mandibules prises ensemble. Leur marge latérale est légèrement oblique et leur extrémité s'arrondit en arc de cercle. Elles sont assez bombées et s'abaissent brusquement vers la pointe.

En dessous, le menton est large, trapézoïdal, avec les angles antérieurs fortement arrondis ; il est bordé de soies rousses, courtes et raides, et porte une ponctuation cicatricielle irrégulière dont chaque point donne naissance à une squamule roussâtre.

Les tibias antérieurs sont droits ; leur bord externe est denticulé en scie, avec deux ou trois dents plus saillantes. La fourche apicale est portée par un prolongement assez avancé et ses dents, courbées en

dess us, arrivent au niveau de la naissance du troisième article des tarses. Les tibias des deux autres paires portent une saillie émoussée un peu au-delà du milieu.

Les tarses sont notablement plus courts que les tibias; l'article terminal très long est au moins égal aux trois qui le précèdent immédiatement, pris ensemble.

Toute la surface, en dessus et en dessous, est couverte de gros points peu enfoncés, plus ou moins serrés suivant les régions du corps, et qui ne laissent lisses que les extrémités des mandibules et des dents principales de celles-ci.

Ces points, d'aspect cicatriciel, donnent naissance à des squamules; ils sont arrondis, un peu moins serrés sur la tête que sur le prothorax. Sur les élytres, ils sont un peu ovalaires, disposés en lignes très régulières et dessinent cinq intervalles, rendant apparentes quatre légères côtes comprises entre la suture et la marge externe.

La couleur est un gris brun plus ou moins foncé, avec des squamules et des soies rousses nombreuses, qui forment un revêtement presque complet et correspondent à la ponctuation décrite plus haut. La partie supérieure et les côtés des mandibules sont pourvues d'une garniture particulièrement serrée de ces squamules qui laissent seulement découvertes les pointes des dents. Par contre ce revêtement fait presque complètement défaut sur la majeure partie de la surface inférieure des mandibules et sur la pointe terminale; ces régions sont d'un brun noir, brillantes, parsemées de points sétigères, et forment contraste avec la couleur de boue de l'insecte. Les squamules sont disposées en lignes sur les élytres; elles forment six rangées longitudinales principales, entre lesquelles se trouvent d'autres squamules, également alignées, mais moins saillantes et moins larges, les squamules principales correspondent à la suture; à la marge externe et aux quatre côtes intermédiaires déjà signalées.

Suivant le développement mandibulaire, et probablement suivant les localités, certains des caractères indiqués ci-dessus varient légèrement.

Le plus grand mâle de Tandjong-Djati, qui est un peu supérieur comme taille à celui de Sétinjak (21 mm. au lieu de 19 mm.), a l' épistome concave au lieu d'être droit, et le denticule entre la dent médiane et l'anté-apicale placé plus en arrière que chez celui-ci. Les dents principales de la mandibule droite sont presque égales, tandis que la plus rapprochée de la base est notablement plus faible chez le spécimen de Sétinjak.

Les mâles de petit développement ont l'épistome d'autant moins concave que leur taille est plus faible;

les mandibules restent dissymétriques, mais la disposition des dents basales à droite et à gauche est beaucoup plus analogue que chez les grands spécimens. Ces dents se rapprochent l'une de l'autre, celles de droite restant toujours un peu plus fortes. Les autres dents et denticules restent visibles et distincts même chez le plus petit mâle de la série (15 mm.). Chez les exemplaires de cette taille, la saillie des joues ne dépasse plus celle des canthus.

♀ Les femelles ressemblent beaucoup aux mâles comme proportions générales, et sont de la même couleur ; toutefois le revêtement de squamules est encore plus serré.

Les mandibules sont grêles ; revêtues de squamules vers la base, ponctuées, nues et noirâtres vers l'extrémité. Elles sont armées d'une seule dent interne, légèrement oblique, située aux deux tiers au moins de la longueur à partir de la base. Le bord frontal est concave ; les angles antérieurs largement arrondis ; les canthus très arrondis en arrière ; la saillie des joues peu visible ; la surface de la tête régulièrement bombée ; l' épistome convexe.

Le prothorax ressemble à celui du mâle, bien que moins élargi en avant ; les dépressions externes sont effacées, de sorte qu' il n' en reste que quatre, disposées en trapèze, la petite base en avant.

Le menton est légèrement trapézoïdal, avec les angles antérieurs fortement arrondis ; sa surface est couverte de points cicatriciels enfoncés.

Les tibias sont canaliculés, rugueux, nettement concaves sur leur bord externe, très finement denticulés vers la pointe, avec une seule dent qui précède immédiatement la fourche. Le prolongement qui porte celle-ci présente, sur son bord interne, la dent caractéristique que l'on voit chez les femelles de ce groupe. Cette dent est très développée et porte elle-même un denticule interne. La fourche atteint le milieu du quatrième article des tarses.

Les autres caractères n'offrent rien d'intéressant à signaler.

Les dimensions principales sont, en millimètres :—

Longueur totale, mandibules incuses : ♂ ♂ 15 à 21, ♀ ♀ 13 à 16.

Longueur des mandibules : ♂ ♂ 2·5 à 4·2, ♀ ♀, 1·5 à 2.

Largeur maxima : ♂ ♂, tête et prothorax, 5·5 à 8.

♀ ♀, élytres, 5·5 à 6·5.

Nigidius Birmanicus, n. sp.

Cette espèce appartient à la section des *Nigidius* caractérisée par des canthus concaves qui, jusqu' à présent,

parait localisée dans la région indo-malaise. Elle est d'assez grande taille, étroite, parallèle, et médiocrement brillante. Le British Museum n' en possède qu' un seul exemplaire, pris à Rangoon.

Tête rectangulaire ; bord frontal formé par deux courbes légèrement concaves séparées par une saillie à l' extrémité de laquelle se trouve la lèvre supérieure constituée par un bourrelet légèrement biconvexe. Les angles latéraux antérieurs sont presque droits ; les canthus s'en détachent par une courbe concave extérieurement qui aboutit à un angle droit, légèrement émoussé, formant l'angle antérieur du canthus. De cet angle part une courbe légèrement concave extérieurement qui aboutit à l'angle postérieur du canthus, plus saillant extérieurement que l'angle antérieur, et assez aigu. Sauf vers ce dernier angle qui est assez prononcé, les canthus sont presque droits et parallèles entre eux. Vus de côté, ils forment cuiller.

La surface de la tête est couverte de points cicatriciels, confluents en arrière, moins gros en avant et plus espacés sur le milieu de la partie frontale. Au voisinage de chaque angle antérieur se trouve une fossette oblique entièrement lisse placée à l'extrémité d'une courbe en accolade dont la pointe est tournée en arrière. Les canthus ont une ponctuation cicatricielle fine et serrée qui leur donne un aspect dépoli. La partie renflée qui forme l'articulation de la tête dans le prothorax est elle-même dépolie et couverte de points cicatriciels écartés, régulièrement disposés. Les mandibules sont assez longues, avec la dent supérieure très développée. Comme d'habitude celle de gauche est tridentée et celle de droite bidentée les deux dents intermédiaires de gauche recevant entre elles la dent unique qui leur correspond à droite. Ces dents sont assez fortes. La dent inférieure de la mandibule gauche est plus voisine de l'apex que la supérieure.

La dent supérieure en forme de corne, est arquée, légèrement inclinée en avant, un peu renflée en arrière à sa base. Sa surface supérieure est, comme celle des mandibules, couverte de points cicatriciels ; sa surface latérale et inférieure ainsi que celle des mandibules, est lisse, brillante, avec une fine ponctuation éparse, visible seulement à la loupe.

Le menton, convexe à la base, est creusé vers le bord antérieur qui est bilobé. Les côtés sont légèrement divergents ; la surface est couverte de points cicatriciels confluents.

Les antennes ont un peigne à lamelles peu développées, avec les tranches antérieures seules feutrées.

Le prothorax, plus large que la tête, est presque parallèle, à peine élargi en avant. Les angles latéraux antérieurs sont arrondis en

demi-cercle ; le bord antérieur est convexe. L'arête qui forme le rebord habituel est peu saillante ; elle reste à peu près parallèle au bord antérieur mais est un peu plus sinueuse. Au milieu existe une petite saillie qui se prolonge par une faible nervure jusqu'au bord antérieur. Les côtés latéraux sont droits jusqu' à l'angle médian, bien marqué, dont le sommet est largement arrondi, puis concaves jusqu' à l'angle postérieur qui est également bien arrondi. Le bord postérieur est très légèrement bisinué. Sur le disque existe une fossette longitudinale médiane qui prend naissance immédiatement en arrière du rebord antérieur et atteint presque le bord postérieur.

La surface n'est que partiellement ponctuée. Les régions lisses sont formées par la partie centrale où se trouve la fossette et par quatre petites surfaces isolées. Le contour de la principale partie lisse est assez complexe, cette surface s'étend un peu le long du rebord antérieur et de la marge postérieure et forme, en outre, une troisième expansion intermédiaire. Un peu en arrière de celle-ci est, de chaque côté du prothorax, une petite plage isolée lisse ; une autre, un peu plus petite, moins nette, se trouve dans le prolongement de l'expansion médiane, au voisinage du bord latéral. La fossette milieu porte une ponctuation très éparse, plus grosse dans le fond.

L'écusson est petit, arrondi au sommet, avec une ponctuation cicatricielle.

Les élytres sont parallèles, arrondis ensemble à l'extrémité; les angles huméraux ne sont pas atténués et sont un peu saillants. Les côtes sont étroites, en forme de nervures ; il en existe huit sur chaque élytre, entre la suture et la marge latérale. La deuxième et la sixième côte se réunissent en arrière ainsi que la troisième et la cinquième qui enferment entre elles la quatrième. Dans chaque intervalle concave se voit, au fond, une chainette formée de gros points cicatriciels très peu enfoncés, ronds, et sur les côtés, une ligne de points beaucoup plus petits.

En dessous, les pièces sternales, sauf le milieu du métasternum, sont couvertes de points cicatriciels. Les épisternes sont canaliculés et lisses. Les épimères prothoraciques sont lisses en avant. Il n'y a pas de saillie postérieure au prosternum, qui est seulement un peu gonflé et bombé, tandis que le mésosternum est légèrement creusé et concave. Les segments abdominaux sont brillants, avec une ponctuation peu prononcée sur les derniers segments, mais devenant plus forte et cicatricielle sur ceux qui sont voisins du thorax.

Les tibias antérieurs portent, outre la fourche terminale, trois ou quatre dents bien marquées et d'autres, plus effacées, plus voisines des fémurs. De plus, leur bord externe est légèrement dentelé en scie. Les tibias intermédiaires et les postérieurs portent une forte

épine aiguë au-delà du milieu, précédée par une autre plus petite. Les tarses ont l'article terminal sensiblement égal aux deux qui le précèdent, pris ensemble.

Les dimensions principales sont :—

Longueur totale, mandibules incluses . .	18·4 mm.
Longueur des mandibules	2·1 „
Largeur maxima, au prothorax . . .	6·9 „

Nigidius laticornis, n. sp.

Espèce très remarquable et tout à fait distincte, représentée par plusieurs exemplaires. Ceux du British Museum viennent des Monts Nyika, Nyassaland, et ont été pris entre 6,000 et 7,000 ft. en juillet 1896, par Mr. A. Whyte. Je possède d'autres spécimens reçus par MM. Staudinger et Bang Haas en 1908 et venant, à ce que je crois, du Kilimandjaro.

Tête longue, plus étroite en arrière, à peu près moitié moins large que le prothorax ; sa surface supérieure est aplatie, un peu concave, presque lisse, brillante. Le bord antérieur a la forme d'une accolade dont le sommet serait bifurqué. Les angles latéraux sont tronqués ; les canthus s'en détachent nettement et forment une forte saillie. Leur bord antérieur est convexe, leur bord latéral presque rectiligne mais oblique, puis convexe extérieurement, de sorte que la plus grande largeur des canthus est presque à leur naissance, bien en avant de l'œil, disposition tout à fait différente de celle que l'on observe en général dans le genre. Vue de côté, la marge externe du canthus décrit une courbe convexe vers le bas, bien au dessous du bord inférieur de l'œil supérieur. En arrière, la partie lisse et légèrement concave de la tête est limitée par deux bosses peu saillantes. Derrière celles-ci, la tête se renfle vers son articulation.

Mandibules dissymétriques, celle de gauche étant armée de deux dents avant l'apex dont une, plus près de la base, supérieure, et l'autre, plus forte, inférieure, tandis que la mandibule de droite ne porte qu'une dent, disposée pour s'emboîter entre les deux dents de la mandibule opposée. Chaque mandibule porte une très forte protubérance supérieure. Cette corne, dirigée vers le haut et en arrière est élargie et aplatie, au lieu d'être plus ou moins cylindrique comme chez la plupart des *Nigidius*, et son extrémité, plus large que sa base, est bifurquée. Cette disposition est tout à fait spéciale et caractéristique.

Le menton, élargi en avant, a son bord antérieur bilobé ; sa surface

assez convexe, est couverte de points cicatriciels assez gros et rapprochés. Les antennes sont plutôt grêles.

Le prothorax est large; son bord antérieur, fortement relevé, forme à sa partie supérieure le contour à trois pointes que l'on rencontre chez beaucoup de *Nigidius*, mais qui est ici particulièrement accusé. La pointe médiane, plue aiguë que les latérales, se prolonge sur la partie déclive du bord antérieur par une arête à peu près verticale. Le disque est marqué par une fossette ovoïde, profonde, dans laquelle se voient des rangées longitudinales de points cicatriciels peu apparents. La région médiane de la fossette n'est pas ponctuée. Une petite dépression, à peu près circulaire, analogue à un gros point enfoncé, se trouve derrière chaque saillie du bord antérieur; une autre, ovalaire, un peu plus grande, existe entre celle-ci et le bord latéral; enfin il y a une troisième paire de dépressions près du bord postérieur, presque à la même distance de l'axe que les fossettes de la première paire.

Les angles latéraux antérieurs sont un peu en arrière de la partie la plus avancée du bord antérieur et à peu près sur la même ligne que les trois saillies formées par la partie relevée de ce bord; ces angles sont obtus, mais non émoussés au sommet, leurs côtés antérieurs sont un peu concaves tandis que leurs côtés latéraux, presque droits, convergent un peu en arrière. L'angle latéral médian est arrondi, et se raccorde par une ligne oblique, sensiblement droite, avec l'angle postérieur qui est aussi arrondi. Toute la surface du pronotum est lisse et polie, cependant les côtés et le bord antérieur portent une ponctuation qui en atténue le brillant.

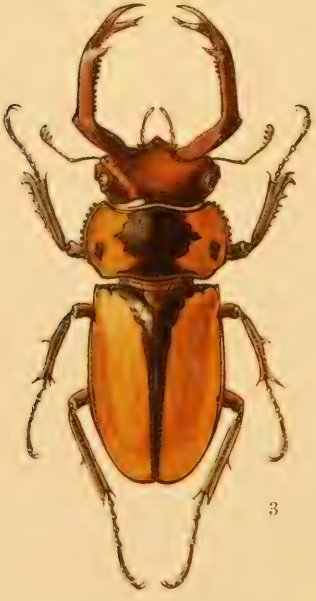
L écusson est plat, ogival aigu, et porte quelques points.

Les élytres sont longues, brillantes, fortement striées. Les intervalles relevés sont assez étroits. On peut en compter huit, et même neuf, suture non comprise, mais les six premiers à partir du bord sutural sont mieux formés. Le quatrième intervalle se termine en arrière dans une boucle formée par le troisième et le cinquième, eux-mêmes entourés par la boucle formée par la réunion du deuxième et du sixième. Les autres intervalles ne se rejoignent pas et se perdent dans la partie apicale. Les sillons qui séparent les intervalles relevés sont marqués par une seule ligne de points cicatriciels peu profonds.

Le prosternum porte une ponctuation cicatricielle, il forme en arrière une protubérance assez marquée, convexe en dessous et légèrement concave en arrière. Le mésosternum et les côtés du métasternum présentent également une assez grosse ponctuation cicatricielle très peu enfoncée. Les fémurs antérieurs sont en forme de gouttière dans la partie qui reçoit le tibia replié. Le bord antérieur du tibia est régulièrement denté. Les tibias intermédiaires et les postérieurs

1

2



3

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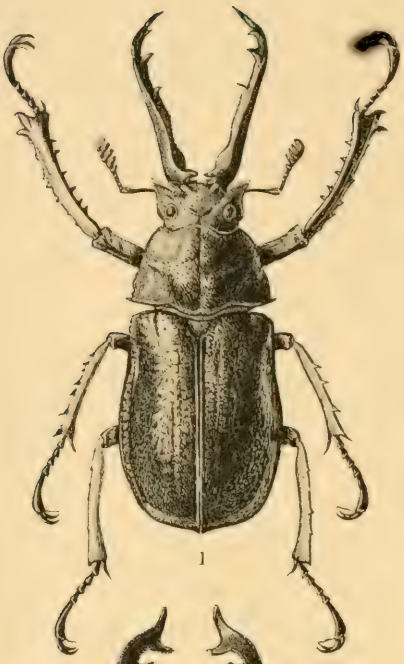
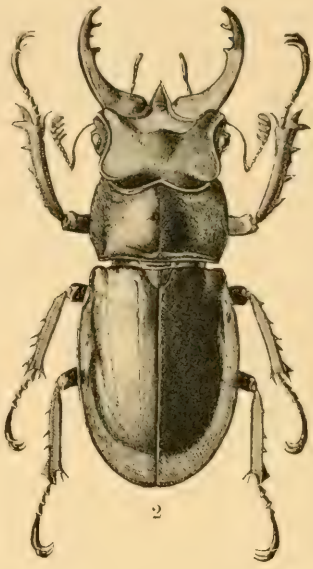
NEW SPECIES OF LUCANIDAE.

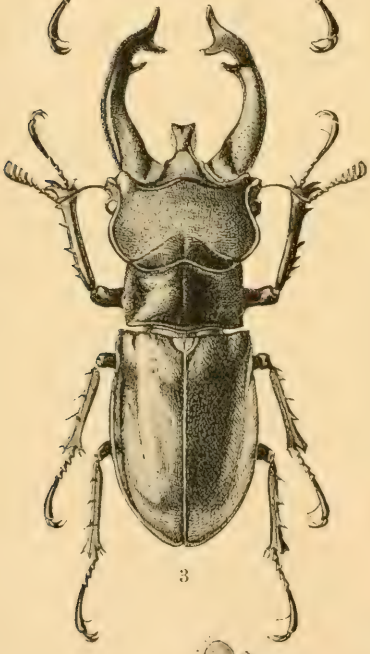
Explanation of Plate XXXIII.

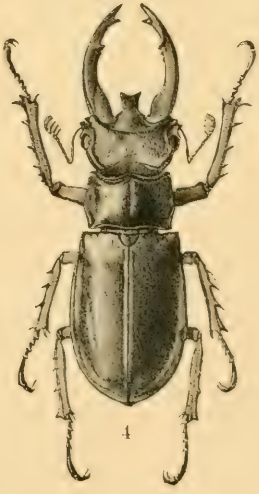
Fig.

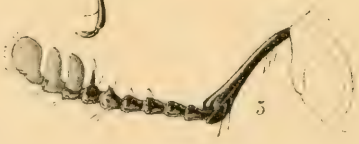
1. *Sphenognathus giganteus*, n. sp. ♂, p. 428.
2. *Sphenognathus giganteus*, n. sp. ♀, p. 430.
3. *Rhaetulus speciosus*, n. sp. ♂, p. 437.











Louis Planet, del. *André & Sleigh, Ltd.*

NEW SPECIES OF LUCANIDAE.

Explanation of Plate XXXIV.

Fig.

1. *Sphenognathus mandibularis*, n. sp. ♂, p. 426.
2. *Lucanus Dohertyi*, n. sp. ♂, p. 435.
3. *Lucanus Fryi*, n. sp. ♂ major, p. 431.
4. *Lucanus Fryi*, n. sp. ♂ minor, p. 431.
5. *Rhaetulus speciosus*, n. sp. ♂, antenna, p. 437.

portent trois épines de grandeur croissante vers l'extrémité. Les tarses sont notablement plus courts que les tibias; l'article terminal sensiblement égal aux deux qui le précèdent immédiatement, pris ensemble.

Les dimensions principales sont :—

Longueur totale, mandibules incluses	14·7 mm.	à	17·5 mm.
Longueur des mandibules . .	1·7 „	à	2 „
Largeur maxima, au prothorax. .	5·2 „	à	6·1 „

Explanation of Plates XXXIII, XXXIV.

[*See Explanation facing the* Plates.]

XIX. *On the* Hymenopterous *Parasites of* Coleoptera. First Supplement.

By Ernest A. Elliott, F.Z.S., and Claude Morley, F.Z.S.

[Read March 1st, 1911.]

Since the publication of our Paper upon this subject, in these Transactions in 1907, much additional matter has come to our knowledge, principally through the works of Nees von Esenbeck, Dours, Professor Thomson, Curtis, Rev. T. A. Marshall, Dalla Torre, Kieffer, and papers in the earlier E. M. M., and by Pierre in Révue Linn. of 1903. This material now appears to have assumed sufficient bulk for publication, and should be used in conjunction with the original Paper, with which it is uniform and concurrently numbered. Additional hosts are printed in capitals and those already known to be attacked, but upon which additional observations are noted, in italics as before.

Oα. CICINDELA CAMPESTRIS, L.

Oβ. CICINDELA SYLVATICA, L.

It has recently become known that our rare Aculeate, *Methoca ichneumonoides*, Latr., is a true external parasite on these species. First, Gottfrid Adlerz observed (Archiv. för Zoologi, 1903, pp. 255–8) *Methoca* attacking larva of *C. sylvatica* on the bank of the Ljungan in Medelpad, Central Sweden. Secondly, the same author (*lib. cit.*, 1906, iv. pp. 1–48) describes in detail experiments with *Methoca* on *C. campestris* larvae in captivity. And lastly, B. E. Bouwman saw (Tijdsch. v. Ent., 1909, pp. 284–294) *Methoca* enter a burrow of *Cicindela* larva at Breda in June; it paralysed its head, thorax and two basal segments, also biting the sternum; the egg is laid on the ventral surface of thorax; the *Methoca* emerges in four or five days, and appears to suck juices from *Cicindela* larva without any distinct incision; it leaves its host in about three weeks and forms a cocoon of sand-grains; no male *Methoca* were seen. Donisthorpe tells us it probably also attacks *Cicindela germanica*, L., since he has found it at Blackgang Chine.

4*a*. CHLAENIUS IMPUNCTIFRONS.*

A new species of the Proctotrypid genus *Prosacantha* has been bred by Riley from this Carabid in North America and named by him (Bull. U. S. Nat. Mus., 1893, p. 191) *P. caraborum*.

6*a*. GYRINUS.*

A species of this genus is said by Ashmead (Canadian Entom., 1894, p. 25) to be preyed upon in Java by his Tryphonid, *Gansocentrus gyrini*.

7. *Gyrinus natator*, Scop.

Hellins supplementing (E. M. M., 1881, xviii, p. 88, Parfitt's notes (*l. c.*, p. 79) on *Hemiteles gyrini*, says that, besides *H. gyrini*, *H. persector* and *Pezomachus ? viduus*, a small species of *Pteromalus* emerged from the cocoons of *G. natator* at Exeter.

10. *Creophilus maxillosus*, Linn.

11. *Ocypus olens*, Müll.

We were much gratified to discover, after the publication of our note on the latter species, Mr. W. F. Frohawk's account of undoubtedly the same host and parasite at Eltham in October 1883 (Entom., 1886, p. 225); in this case there were but nine parasites. Those we mentioned very certainly belong to the genus *Proctotrypes*, Latr. (= *Codrus*, Jur.) and not to *Apanteles*, as surmised; but the species is less positive, since those bred by Frohawk belonged to *P. ater*, Nees, while Kawall refers his to *C. pallidipes*, Jur., which also is not uncommon in Britain. It will be noted that Frohawk has no hesitation in calling the host-larva that of *C. maxillosus*, while we supposed it from purely circumstantial evidence to be that of *O. olens*. Curtis figures a similar parasitic pupa (Farm Insects, pl. G, fig. 47). Doubt might be cast upon the identity of the host of *Proctotrypes calcar*, Hal. (*cf.* Entom., 1867, p. 342) had not the legs of *Lithobius* been expressly mentioned. Mr. Edward Step has given us four females of *Proctotrypes pallidipes*, Jur., which he bred in 1909 from a larva of *C. maxillosus*, found at Worcester Park, Surrey.

12. *Cafius xantholoma*, Grav.

Mr. Frank Morey took six *Platymischus dilatatus* among this species on the beach at high-water mark in Freshwater Bay, I. W., on August 31, 1906, and Mr. P. de la Garde found it beneath a stone on the river beach at Teignmouth in June 1909.

12*β*. XANTHOLINUS.

"Mr. Smith exhibited the larva of a *Xantholinus*, to the underside of which were attached the pupae of a species of *Proctotrupidae*" (Proc. Ent. Soc. Meeting, May 4, 1868).

12*γ*. ANISOTOMA CINNAMOMMEA, Panz.

I have seen a small ♀ Alysiid, bred by Donisthorpe from truffles together with this beetle, though the parasitism was not established.—(C. M., ii, '08.)

13. *Teretrius picipes*, Fab.

Walker simply remarks (Ent. Mag., 1833, p. 141) that Dalman "supposes *Perilampus micans* to be a parasite of *Lyctus canaliculatus* and *Dendrophilus picipes*, particularly of the latter" (*cf.* Swed. Trans., 1822, p. 402). Nees, however, is much more explicit (Hym. Mon., ii, 49): "In Westrogothia, in fulcris aedium, quercinis, a *Lycto canaliculato* et *Histere picipede* perforatis, e foveolis illorum serena die provenientem a se captum esse, b. Dalmanus memorat, argumentum inde hauriens hanc speciem metamorphosin in *Histeris picipedis* larvis subire. Scilicet cum nulla sibi ab ullo collectore hujus insecti exempla unquam missa sint, neque id a se inventum nisi in illis fulcris, in quibus *Hister picipes* degeret, cum *Lyctus canaliculatus* ubique fere vulgaris hoc consorte liber omnino videatur, ab infrequentia dicta *Histeris* etiam pendere *Perilampi*, hujus consortis, exiguam per orbem copiam. Nos autem simillimum ejus prope Sickershausen, ubi *Hister picipes* perquam rarus occurrit, Junio, Julio et Augusto mensibus in floribus, praesertim umbellatarum, v.c. *Pastinaceae*, plus una vice cepimus." Is *Teretrius* simply inquiline in the *Lyctus* burrows?

13*a*. COCCINELLID.*

There is a specimen of *Euphorus sculptus*, Cresson, a North American Braconid, in Marshall's collection, in Brit. Mus., together with a perfect Coccinellid beetle, and the cocoon spun by this parasite in emerging from it.

16*a*. COCCINELLA QUOTATA * (= *Mysia pullata*, Say).
16*β*. COCCINELLA SANGUINEA * (= *C. novemnotata*, Herbst.).
16*γ*. HIPPODAMIA CONVERGENS, Guér.*
16*δ*. CYCLONEDA SANGUINEA, Linn.*
16*ε*. PSYLLOCORA VIGINTIMACULATA, Say.*

From these five American Coccinellids, Howard records his Chalcid, *Homalotylus obscurus* (Descr. N. Amer. Chal. 22 *et* Insect Life, 1891, p. 193), upon his own and Chittenden's authority. His parasite is now synonymised with *H. terminalis*, Say (*cf.* Ashmead, Proc. U. S. Nat. Mus., 1900, p. 378).

16*ζ*. SCYMNUS.

"*Encyrtus fumifascia*, Walk.," a MS. name, is said by Dours (Cat. Hym. France, 91) to have been bred from a larva of this genus by Perris. *Scymnus* larvae are, however, said to prey on those of the Hemipterous *Aleurodes Chelidonii*, Linn., from which the *Encyrtus* more probably emerged (*cf.* Westw. Introd. ii, 443).

16*η*. SCYMNUS PINI-ABIETIS.*

From this North American species, Shimer records (Trans. Amer. Ent. Soc., 1869, p. 385) a parasite, which he describes as *Eutelus Scymnae*, in a note. It is now synonymised with *Homalotylus terminalis*, Say.

16*θ*. SCYMNUS CERVICALIS, Muls.*

Homalotylus similis is described by Ashmead (Trans. Amer. Ent. Soc., 1887, p. 190) as preying upon this species in Florida.

16*i*. SCYMNUS FLAVIFRONS, Blkb.*

From a species under this name, Howard (Proc. U. S. Nat. Mus., 1898, p. 239) and Ashmead (*l. c.*, 1900, p. 389) record the former's Chalcid, *Heterarthrellus australiensis*, bred at Parametta, in New South Wales.

18*a*. ENDOMYCHUS BIGUTTATUS, Say.*

Ashmead has erected a new genus for the reception of a Chalcid species, *Endomychobius flavipes* (Trans. Amer. Ent. Soc., 1896, p. 227), bred from this host in British Columbia.

19*a*. STELIDOTA STRIGOSA, Gyll.*

The North American *Proctotrypes obsoletus*, Say (Boston Journ. Nat. Hist., 1836, p. 377), has been recorded from this Nitidulid by Riley, Howard and Comstock.

21*a*. ANOMMATUS 12-STRIATUS, Müll.

Mr. E. A. Fitch "exhibited a new species of *Proctotrupidae* from the Rev. T. A. Marshall, taken in Rothen Wood in company with *Anommatus* 12-*striatus*, four to six feet under ground" (Meeting of Ent. Soc., July 5, 1882).

22*a*. SILVANUS SURINAMENSIS, Linn.

Webster has observed this species to be preyed upon in America by *Neoscleroderma* (*Ateleopterus*) *tarsale*, Ashm. (Kief., Proct., i, 236; *cf.* Bull. U. S. Nat. Mus., 1893, p. 45).

22*β*. CATOGENUS RUFUS, Fab.*

Kieffer adds that Ashmead's Proctotrypid, *Apenesia coronata*, has been bred from this American Cucujid (Proct., i, 236).

24*a*. TROGODERMA TARSALE, Melsheim.*

Belfrage has observed *Laelius trogodermatis*, Ashm., to prey upon the larvae of this species in British Columbia (Kief., Proct., i, 237).

24*β*. MACRONYCHUS QUADRITUBERCULATUS, Müll.

M. Pérez tells us that in France a species of Chalcid, named by him *Pteromalus macronychivorus* (Ann. Soc. France, 1863, p. 631), has been bred from this host.

25*a*. DERMESTES VULPINUS, Fab.

Exochus gravipes, Grav., is given by Dalla Torre (Cat. Hym., iii, 211) as parasitic upon this cosmopolitan beetle, upon the authority of van Vollenhoven; but we have failed to discover the reference and consider it almost certainly an error, since the Exochini are, probably exclusively, attached to Lepidoptera.

26*a*. ATTAGENUS PELLIO, Linn.

We also feel sceptical respecting the accuracy of Doumerc's record of the parasitism of *Ichneumon ruspator* = *Odontomerus dentipes*, Gmel., upon this species (*cf.* his observations on the subject, Ann. Soc. Fr., 1859, Bull., pp. 172–3).

28*a*. LEPIDODERMA ALBOTECTA, Waterh.*

Like *Oryctes* in Europe, this species is attacked by a *Scolia* in the Antipodes. Froggatt says (Australian Insects, 1907, 105) of *Dielis formosa*, Guér., "this insect has been found in Queensland destroying the underground grub of the Sugar-cane Beetle (*Lepidoderma albohirtum*," sic).

32. *Anthaxia quadripunctata*, Linn.*

Kriechbaumer gives his new Ophionid, *Pyracmon pectoralis* (Ann. Nat. Hofmus. Wien., 1890, p. 484, ♂) as also parasitic upon this beetle.

32*a*. ANTHAXIA MORIO, Fab.*

"*Atanycolus denigrator*, Nees. Par. de l' *Antaxia morio*. (Perris)."—(Dours' Cat., 74).

32*β*. CHRYSOBOTHRIS FEMORATA, Oliv.*

From this American Buprestid, Riley and Howard have bred *Labena apicalis*, Cress. (Dalla Torre, Cat. Hym., iii, 522).

32*γ*. CHRYSOBOTHRIS DELECTA, Lec.*

Ashmead describes his Chalcid, *Euchrysia maculipennis* (Trans. Amer. Ent. Soc., 1896, p. 232), which had been bred in California from this beetle.

32*δ*. CHRYSOBOTHRIS.

We are indebted to Mr. E. P. Stebbing for three males of the Pimplid, *Ephialtes iridipennis*, Morl., which he bred from some species of this genus at Simla about 1902.

34*a*. AGRILUS OTIOSUS, Say.*

A new species of *Eurytoma* has been described by Ashmead (Trans. Amer. Ent. Soc., 1894, p. 325), under the name *E. agrili*, which was believed to have emerged from this beetle in Virginia.

34*β*. TRACHYS MINUTA, Linn.

From this species, Dours tells us (Cat. Syn. Hym. de France, 1874), that *Microgaster albipennis*, Nees (p. 80), *Eulophus cervicornis*, Först. (p. 107), and *Entedon caelestis*, Gour. (p. 109), have been bred by M. Goureau in France.

35*a*. MELASIS BUPRESTOIDES, Linn.

Diospilus melasidis, Marsh., of which both sexes were bred by M. Decaux from the larvae of this species in France, is described by the former (André, Bracon. d'Europ., iii, p. 234).

36. *Agriotes obscurus*, Linn.

Curtis states (Farm Insects, 159) that the wireworm, whence the destroyer was shown to Kirby by Mr. Paul, of Starston, in Norfolk, was *A. obscurus*. In a fully-grown wireworm, Curtis himself found (*l. c.*, 181) two or three

white maggots, and another had already changed into a chrysalis from which he could see that it was a hymenopterous insect (*Proctotrypes*, in footnote). He quotes Bierkander (Communic. Bd. of Agric., vol. iv. p. 414), who says that six of thirty wireworms he had under observation were parasitised, and that "from one of these worms, with the loss of life of the host, six, ten, thirteen, to twenty guests have come out. Which ichneumon this is, I have not yet discovered."

36*a*. AGRIOTES LINEATUS, Linn.

Curtis also figures (Farm Insects, pl. G, fig. 46) a larva, believed by him (*l. c.*, 198) to be that of this beetle, infested by *Proctotrypes* larvae, one of which pupated and protruded, accidentally he erroneously considers (cf. *Creophilus maxillosus*, ante), through the host's skin. It was sent him in August, 1841, from Surrey.

36*β*. MALTHODES LACINIATUS, Kiesw.*

Nees suggests (Mon. Hym., i, 243) some association between *Telephora laciniata* and his Braconid *Alysia manducator* on *Hieracium*; but the latter is now known to attack Diptera.

40*a*. THANASIMUS.

From an undetermined species of this genus, Ashmead has described a parasite under the name *Tetrastichus thanasimi* (Trans. Amer. Ent. Soc., 1894, p. 343).

43*a*. PTINUS.

Giard has given (Bull. Soc. Fr., 1898, p. 50; *cf.* Kief., Proct., i. 451 *et* 455) an interesting account "Sur les *Cephalonomia* parasites des larves de Ptinides," in which he describes a new species, *C. Xambeui*, whose larvae he found preyed gregariously to the number of fifteen or twenty in *Ptini*-cocoons.

43*β*. PTINUS FUR, Linn.

For the account of parasitism of some Proctotrypid, which Kieffer (Proct., i, 225) supposes to belong to the

genus *Cephalonomia*, *cf.* Lichtenstein's "Note sur *Gonatopus ptinorum*" (Bull. Soc. France, 1874, p. xxi).

46. *Anobium.*

Walker says *Cheiropachus tutela* is found "on beams of wood perforated by *Anobium*" (Ent. Mag., 1837, p. 15); that *Trigonoderus ductilis* occurs "on posts and beams of wood perforated by *Anobium*, etc." (*l. c.*, p. 18); and that ♀♀ of *Calosoter aestivalis* "stand in clusters near the holes perforated by *Anobium*" (*l. c.*, p. 360).

47. *Anobium domesticum*, Fourc.

Dalla Torre says (Cat. Hym., iii, 434), upon Rondani's authority, that *Pimpla inquisitor*, Scop. = *stercorator*, Fab., also preys upon *A. striatum*; this appears to be a disproportionately large parasite. *Thcocolax formiciformis*, Westw., is said by Fitch (Entom., 1881, p. 21) to certainly have been parasitic upon this beetle in an old aquarium-stand, whence they were plentifully bred by Mr. E. A. Butler. And early in May, 1909, I received many specimens from a lady, who found them emerging from the holes of this beetle in a valuable wooden box at Grantham. I have recently taken imagines of both *Spathius exarator*, Linn., and *Hecabolus sulcatus*, Curt., in outhouses in my garden at Monk Soham among those of the beetle; both sexes of the former occur annually, but were exceptionally abundant in 1909.—(C. M., 1911.)

47*a*. ANOBIUM VILLOSUM, Bon.*

Dours records (Cat. 103) *Pteromalus gonatus*, Walk., and Kieffer (Proct., i, 421) *Laclius Perrisi*, Kief., upon Perris' authority, as parasitic upon this host.

49. *Anobium paniceum*, Linn.

More recently Möller has described another parasite of this cosmopolitan beetle, under the name *Arthrolytus puncticollis* (Ent. Tidskr., 1882, p. 180, *et* 1883, p. 104) from Sweden.

51. *Ernobius mollis*, Linn.

The synonymy we previously gave, queried, is correct. Rondani has confirmed Westwood's doubtful connection

between *Anobii* and *Perilampus angustus* (*cf.* No. 46), Nees, by breeding out the latter from *E. mollis*, according to Dalla Torre (Cat. Chal., 354). During a shower on June 12, 1908, we were sheltering in a wood at Wangford St. Martin, Suffolk, and took a ♀ of *Doryctes striatellus*, Nees, hovering at a beetle-boring, evidently with the intention of ovipositing therein; on cutting out the boring, which was in a pine railing, we discovered larvae and immature imagines of *E. mollis*. No host has hitherto been assigned to this Braconid, but it is probably not uncommon since Mr. Donisthorpe has taken it also "at a beetle-boring in fence, 1907."—(MS.)

54. *Anobium pertinax*, Linn.*

Goureau also found *Cerocephala cornigera*, Westw., to be parasitic upon *A. pertinax* (Dours' Cat., 92); and Dalla Torre gives *Polyclistus* (*Exochus*) *femoralis*, Fourc., on the authority of van Vollenhoven (Hym. Cat., iii, 216); the latter more probably attacks Pyralids.

54*a*. NICOBIUM CASTANEUM, Oliv., var. *hirtum*, Illig.*

Kieffer (Proct., i, 234) says that *Sclerodcrma domesticum*, Latr., preys upon *Nicobium hirsutum*—probably a lapsus calami for this variety—and undergoes its ecdysis in the cocoons of the Coleopteron: they all belonged to the var. *longiventre*, Kief.

57. *Ptilinus pectinicornis*, Linn.

Note that the host of *Polysphincta elegans* is not specified by Ratzeburg (Ichn. d. Forst., ii, 101). Of *Hecabolus sulcatus*, Curt., Haliday writes (Ent. Mag., 1837, p. 49), "In larvis *Ptilini pectinicornis* sobolem procreat.—Dnus. T. G. Rudd, in Curtis' Br. Ent." Smith adds *Calosota vernalis*, Curt., to the parasites of this species (Trans. Ent. Soc., 1852, p. 83). There are also two ♀♀ *Spathius exarator* in Marshall's col. labelled "Bishops Teignton, ex *Ptilinus pectinicornis*." Mr. E. A. Newbery found several of both sexes of *H. sulcatus* inside the borings of this beetle in an oak gate-post during June, 1911, at Dovercourt, Essex.

61. *Dorcatoma dresdensis*, Herbst.*

Bracon (*Diospilus*) *melanoscelus*, Nees, and *B. dispar*, Nees, are also recorded (Nees, Mon. Hym., 63 *et* 64) from the same host and situation as those previously mentioned.

62. *Dorcatoma setosella*, Muls.

Kieffer (Proct., i, 235) says the parasite already referred to belongs to his v. *sulcata*.

63. *Sinoxylon sexdentatum*, Oliv.*

At the same place it is said that the specimen recorded by Giraud belongs to Kieffer's var. *sulcata*; at *lib. cit.*, 420, *Laelius tibialis*, Kief., and *L. Perrisi*, Kief., are also said to have been bred by Perris at Mont-de-Marsan from this host.

64. *Bostrychus capucinus*, Linn.

Perris' record very possibly referred to *Dorycles leucogaster*, Nees, both sexes of which were bred in some numbers from this beetle in Austrian oak in a timber-yard near the Millwall Docks in London during July 1908, as was recorded (E. M. M., 1908, p. 270) under the erroneous name *Bracon flavator*, Fab. (corrected Entom., 1909, p. 61). The host had bred in this locality for two or three years.

66. *Lyctus canaliculatus*, Fab.

Cf. notes under No. 13, *ante*. Dalla Torre (Cat. Chal., 355) gives *Perilampus micans* as preying without doubt upon the present species, upon Rondani's authority.

67*a*. LYCTUS STRIATUS, Melsheim.*

A new species of the Chalcididous genus *Eurytoma* has been described by Ashmead (Trans. Amer. Ent. Soc., 1894, p. 325) from this beetle, under the name *E. lycti*, from Virginia.

67*β*. CIS.*

Chittenden has bred a new species of Proctotrypidae, from an undetermined individual of this genus in New York, which has been described as *Anoxus Chittendenii*, Ashm. (Bull. U. S. Nat. Mus., 1893, p. 68).

68. *Cis boleti*, Scop.

As to Nees' synonymy of *Meteorus atrator*, Curt., *cf.* his Mon., ii, 399. *Astichus arithmeticus*, Först., is also recorded as parasitic upon this beetle by Dours (Cat., 107). *Cephalonomyia formiciformis* "were taken by Mr. C. J. Pool, in burrows of *Cis boleti*, in fungus from Epping and Enfield" (Ent. Rec., 1907, p. 260).

68*a*. CIS PYGMAEUS, Marsh.

Donisthorpe found some specimens of *Cephalonomyia formiciformis*, near London, "on a tree infested by *Cis pygmaeus*" (Ent. Rec., 1907, p. 260).

68*β*. CIS FUSCIPES, Mell.

"*Plastanoxus Chittendeni*, Ashm., parasite de *Cis fuscipes* dans des champignons," in America (Kief., Proct., i, 236).

69. *Cis laminatus*, Mell.

Kieffer (Proct., i, 235) says the parasite of this beetle, already mentioned, belongs to his var. *sulcata*.

72*a*. ERGATES FABER, Linn.*

Dalla Torre gives *Sichelia* (*Xylonomus*) *filiformis*, Grav., as having been bred by Ratzeburg from this Longicorn (Cat. Hym., iii, 383); we fail to follow him.

72*β*. PHORACANTHA OBSCURA, Don.*

The peculiar *Megalyra fascipennis*, Westw., has been seen by Mr. Rowland Turner to actually oviposit in the burrows of this species at Mackay, in Queensland (v. v.). W. W. Froggatt tells us (Australian Insects, 1907, 90) that he also has bred the same parasite from larvae of this genus.

72*γ*. PIESARTHRIUS MARGINELLUS, Hope.*

Froggatt adds (*lib. cit.*, 89) that he has found as many as fifty *Aulacus apicalis*, Westw., "each enclosed in a thin parchment cocoon, all matted together in a single cavity" of this longicorn, upon the larvae of which they had preyed, in Australia.

73. *Cerambyx.*

"Sir S. S. Saunders exhibited *Scleroderma domestica*, Westwood, received from M. André, bred from the larva of a longicorn beetle" (Meeting Ent. Soc., Nov. 2, 1881); and read further notes respecting it (Meeting, Dec. 7, 1881).

74*a*. OXYPLEURUS NODIERI, Muls.*

An account of the ektoparasitism of *Scleroderma domesticum*, Latr., upon this rare longicorn at Arcachon, Gironde, is given in Proc. Ent. Soc., 1881, pp. xl *et* xxxiii:—Rev. Père Belon found about a dozen larvae on a single host (*cf.* also Kief., Proct., i, 233).

75. *Aromia moschata*, Linn.

Polysphincta lignicola is also given as parasitic upon *Cerambyx moschatus* by Dours (Cat., 67). No doubt can be felt that Bouché is in error in recording (Stett. Ent. Zeit., 1847, p. 164) the well-known parasite of fossors, *Perithous mediator*, Fab., from this species. On August 3, 1908, Morley received from Mr. Roland Smith a perfect ♂ of this beetle, taken recently by the Lea at Clapton, from which two ichneumonidous larvae had emerged the day after he had killed it with chloroform; no knowledge could be gleaned of the nature of the larvae, which, however, go to prove the species not immune from attack in Britain. Elliott captured a ♀ *Ephialtes heteropus* at Matley Bog in the New Forest, at a spot where this beetle is abundant, in June, 1907.

75*a*. PURPURICENUS KOEHLERI, Linn.*

From this beautiful species Giraud tells us (Verh. z.-b. Ges., 1854, p. 605) that Perris has bred the Evaniid, *Aulacus striatus*, Jur.

76. *Hylotrupes bajulus*, Linn.

Dalla Torre points out (Cat. Hym., iii, 588) that *Cryptus seticornis*, Ratz. = *C. cyanator*, Grav., was also raised by Ratzeburg from this species; but his authority is obscure.

79. *Callidium sanguineum*, Linn.

Dalla Torre adds (Cat. Hym., iii, 383) *Xylonomus filiformis* to its parasites, upon Mocsary's authority.

80. *Callidium variabile*, Linn.

The records under No. 95, *Hoplosia fennica*, Payk., must be transferred to the present species. Ratzeburg's *Cerambyx fennicus* being the variety of *Callidium variabile* with blue, violet or green-black elytra as shown on Plate in his "Forstinsekten."

81*a*. CALLIDIUM ANTENNATUM, Newm.*

From Virginia, Ashmead describes (Trans. Amer. Ent. Soc., 1896, p. 223) a Chalcididous parasite under the name *Aetroxys* (recte *Hetroxys*) *callidii*.

83*a*. GRACILIA MINUTA, Fab.

Dours gives (Cat., 109, 110) *Entedon confectus*, Walk., and *Tetrastichus dcipyrus*, Walk., as parasitic upon *Gracilia pygmaea*, on Perris' authority.

85. *Rhagium bifasciatum*, Fab.

Bedwell also took *Ischnoceros rusticus* in the New Forest, in pine stumps which he was splitting, and where he found the same host, in June, 1904.

86. *Rhagium indagator*, Fab.

87. *Rhagium inquisitor*, Fab.

Nees tells us in his Addenda (Mon., ii, 399) of *Bracon impostor*: "Metamorphosis in larva *Rhagionis indagatoris* et *inquisitoris* sub cortice pini," etc.; and Dalla Torre adds (Cat. Hym., iii, 383) that the former is also preyed upon by *Xylonomus rufipes*, Grav., on Brischke's authority.

88. *Rhagium mordax*, Fab.

Ratzeburg is instanced by Dalla Torre (Cat. Hym., iii, 477) as also recording *Ephialtes tuberculatus* from this species.

90. *Strangalia quadrifasciata*, Linn.

"Mr. H. St. J. Donisthorpe exhibited an example of *Helcon ruspator*, L., a Braconid new to Britain, taken at Cannock Chase on the 16th of July last, in a cell of *Strangalia 4-fasciata* in a fallen birch tree, and an example of the host captured at the same time. He pointed out that this very fine addition to the British List is recorded as parasitic on the same beetle on the Continent" (Proc. Ent. Soc., 19 Oct., 1910).

90*a*. STRANGALIA BIFASCIATA, Müll.*

Ephialtes gracilis, Grav., is recorded from the synonymous *Saperda cruciata* by Dours (Cat., 70) and Dalla Torre (Cat. Hym., iii, 472), upon Rondani's authority.

92–92*a*. CRIOCEPHALUS RUSTICUS, Linn.*

Marshall says of his *Coeloides Neesii:* "M. Seurat informs me that this species is common in the département de la Marne. He has bred ♂♀ examples of it, which were external and solitary parasites of the larvae of *Astynomus aedilis*, L., and of *Criocephalus rusticus*, L."

92*β*. ACANTHOCINUS OBSOLETUS, Oliv.*

Ashmead has described (Trans. Amer. Ent. Soc., 1887, p. 198) both sexes of a Chalcid preying upon this species in Florida, under the name *Metastenus acanthocini*.

92*γ*. LEPTOSTYLUS BIUSTUS, LeC.*

From this American longicorn Ashmead describes (Proc. Ent. Soc. Washington, 1896, p. 12) his Chalcid, *Eusandalum* (*Ratzeburgia*) *Hubbardii*.

94*a*. LEIOPUS VARIEGATUS, Haldem.*

In Insect Life, 1893, p. 247, Chittenden records the breeding of the North American *Ephialtes irritator*, Fab., from this species (*cf.* Morley, Entom., 1909, p. 135).

97. *Exocentrus punctipennis*, Muls.*

The "Braconid," formerly referred to, appears to be *Laelius bipartitus*, Kief. (Proct., i, 235) and *Blacus exocentri* to be a MS. name, as were so many of those given by Dr. Giraud in his posthumous paper of 1877.[1]

102*a*. MONOCHAMMUS SCUTELLATOR, Say.*

102*β*. MONOCHAMMUS CONFUSOR, Kirby.*

Upon both these American species Provancher has recorded (Fauna Entom. Canada, Hym., 1883, p. 447) the parasitism of our British *Rhyssa persuasoria*, which with us invariably confines its attacks to the Siricidae. *M. resutor*, Kirby, synonymous with the former host, is said by Westwood (Trans. Ent. Soc., 1851, p. 224) to be attacked by his new Evaniid, *Aulicus resutorivorus*.

105. *Saperda populnea*, Linn.

Mocsary, according to Dalla Torre (Cat. Hym., iii) has also raised *Cryptus viduatorius*, *Ephialtes luteipes* and *Xylophrurus lancifer* from this species; and Mayr appears satisfied (Verh. z.-b. Ges., 1874, p. 101) that the ♀ of *Torymus quercinus*, Boh. (= *T. tarsalis*, Walk.), was bred from it by Tschek in Austria.

106. *Saperda scalaris*, Linn.

Dr. Rudow records (Entom. Nachr., 1881, p. 310) his new *Coleocentrus scutellaris* as parasitic upon this species.

106*a*. SAPERDA DISCOIDEA, Fab.*

Harrington says (Canad. Entom., 1891, p. 132) that his new Canadian *Xorides caryae* was bred from this species

[1] M. Jules de Gaulle, the learned author of the recent full Catalogue of French Hymenoptera, has been good enough to write me concerning Giraud's insects: "La collection Giraud est au Muséum de Paris; elle est d'un grand intérêt, mais Giraud avait le tort de travailler seul et parait n'avoir eu guère de relations avec les ichneumonologistes de son temps; la collection est elle remplie de noms inédits, qui pour la plupart s'appliquent à des espèces soit déjà décrites soit surtout décrites depuis sa mort. En outre les localités sont rarement indiquées: les espèces proviennent le plus souvent d'Autriche."—(C. M.)

or *Dorchaschema nigrum*, Say, which is very rare and occurs only in the Southern States.

108*a*. OBEREA ERYTHROCEPHALA, Sch.*

Morley (Ichn. Brit., iii. 254) is sceptical respecting Schmiedeknecht's suggestion that the Pimplid, *Provinetus decimator*, Grav., which is usually found among *Euphorbia cyparissias*, in whose stems this longicorn feeds, attacks *Oberea*, and regards it as more probably attached to the Lepidopterous *Gortyna flavago* in thistle stems. But Pastor Konow is stated by Marshall (Bracon. d'Europ., iii, 28) to have bred several individuals of both sexes of *Vipio guttiventris*, Thoms., from the larvae of this longicorn in Mecklenburg.

108*β*. OBEREA TRIPUNCTATA.*

A new species and genus, *Zaleptopygus Obereae*, have just been published by H. L. Viereck (Proc. U. S. Nat. Mus., 1911, p. 294) for the reception of an Ophionid ichneumon, allied to *Cremastus*, Grav., which has been bred at Chicago from this host by Girault.

109. *Tetropium luridum*, Linn.

Xylonomus precatorius, Fab., is said to prey upon this species, as well as upon the above *Callidii*, by Dalla Torre (Cat. Hym., iii, 386), who refers to Ratzeburg as his authority.

110. *Tetropium castaneum*, Linn.

The *Lissonota* we previously referred to under this host is not *L. palpalis*, as tentatively suggested, but *L. varicoxa*, Thoms. (*cf.* Morl., Ichn. Brit., iii., 220).

110*a*. OEME GRACILIS, Lec.*

From this American longicorn, Ashmead has described a new species of Ratzeburg's genus *Eusandalum*, called *Ratzeburgia Coquillettii* (Proc. Ent. Soc. Washington, 1896, p. 11).

110β. BRACHYTARSUS VARIUS, Fab.

Under the Chalcid *Encyrtus sylvius*, Nees (Mon., ii, 206) quotes Frisch. Ins., ix, 38: "Aber Anno 1730 hab' ich fast in keinem die in Nummer xxi gemeldten Käfer gefunden"; and adds in a note: "Insectum, a Frischio l.c. descriptum, coleoptratum Dermestinorum ordinis est, uti ille *Anthribus varius*, quem cl. Dalman in *Cocco Aceris* illaeso a se inventum, non Cocci parasitam, sed fortuito e cortice arboris exclusum Coccum penetrasse conjicit. Verum cum Frischius noster larvam in Cocco observaverit ex eademque imaginem coleoptratam prodeuntem viderit, vix est, quod dubitemus, etiam *Anthribum varium* in Coccis metamorphosin peragere." This parasite is now well known to prey on Coccids.

110γ. BRUCHUS.

A Chalcid, parasitic in Canada upon an undetermined species of this genius, has been described by Ashmead (Trans. Amer. Ent. Soc., 1894, p. 328) under the name *Bruchophagus borealis*. There is some evidence of the probability of a member of the same genus having been introduced into Britain, along with its host, in 1910.

111α. BRUCHUS MARGINELLUS, Fab.*

Dours gives (Cat. Hym. France) *Eupelmus DeGeeri*, Dalm. (p. 89), *Eurytoma rufipes*, Walk. (p. 96), *Pteromalus varius* and *P. affinis*, Walk. (p. 104), as parasites, on Goureau's authority, upon this species.

118. *Bruchus villosus*, Fab.

Ratzeburg also appears to have bred his *Entedon spartii* (Ichn. d. Forst., iii. 211) from this host; and Rondani's *Sparthiophila bruchicida* (Bull. Soc. Ent. Ital., 1872, p. 208; fig. *lib. cit.*, 1877, pl. iii, ff. 94–96), an allied parasite, was bred by him from *B. spartii*, with his *Pteromalus latipes* (*l. c.*, 1874, p. 131, *et* 1877, p. 194).

119. *Bruchus rufipes*, Herbst.*

From *B. nubilus*, Boh., Dours records (Cat., 102, 107 *et* 108) *Semiotus varians*, Walk., *Eulophus Coecilius*, Walk., and *Entedon Pentheus*, Walk., on the authority of Perris and Goureau.

121. *Bruchus pallidicornis*, Schh.

Goureau is said to have also bred from this species *Pachylarthrus breviventris*, Först. by Dours (Cat. France, 99).

121*a*. BRUCHUS AUREUS.*

A Chalcid, parasitic upon this species, has been described from New Mexico by Ashmead (Trans. Amer. Ent. Soc., 1894, p. 342) under the name *Holcopelte producta*.

121*β*. BRUCHUS CICERI.*

Rondani records, from a beetle under this name—which is not given in Heyden, Reitter and Weise's Cat. Col. Europ., 1906—a Chalcididous parasite, which he describes as *Entedon basalis* (Bull. Soc. Ent. Ital., 1877, p. 174, pl. i, ff. 11–13).

121*γ*. BRUCHUS ALBOSPARSUS, Fahr.*

Dr. Fairmaire has described two Chalcids, *Eulophus gummiferae* and *Pteromalus Doumeti* (Rev. et Mag. Zool., 1877, p. 207), which prey upon this species in Tunis.

121*δ*. BRUCHUS EXIGUUS, Horn.*

As preying upon this American species in Iowa and Florida, Ashmead has instanced his new Chalcids *Meraporus bruchivorus* (Bull. Ohio Exp. Stst., 1895, p. 161) and *Eupelmus cyaniceps* (Trans. Amer. Ent. Soc., 1886, p. 129).

121*ε*. BRUCHUS VARIUS, Oliv.*

Upon Goureau's authority, Dalla Torre (Cat. Chal., 150, 274, 330) instances *Systole albipennis*, *Eupelmus atropurpureus*, Dalm., and *Pteromalus tenuis*, Walk., as attacking this species in France.

121*ζ*. BRUCHUS ALBISCUTELLARIS, Horn.*

A Chalcid, parasitic in New Mexico upon this species, has been described by Ashmead (Trans. Amer. Ent. Soc., 1894, p. 328) under the name *Bruchophagus Mexicanus*.

121*η*. SAGRA BOISDUVALII, Dup.*

Vollenhoven says (Stett. Ent. Zeit. xl, 1879, p. 150) that Herr Binnendyk, Hortulanus at Buitenborg, Java, bred twelve Ichneumonids, which he names *Pimpla Sagrae*, from cocoons of this beetle taken from roots of a *Rhizophora*.

121*θ*. FIDIA VITICIDA, Walsh.*

The Proctotrypid, *Fidiobia flavipes*, Ashmead, is recorded by its author (Journ. Cincinnati Soc. Nat. Hist., 1894, p. 171) as having been bred from this Eumolphid beetle.

123*a*. CRIOCERIS LILII, Scop.

Goureau is said by Dours (Cat., 61) to have found *Campoplex errabundus*, Grav., to be parasitic upon *C. merdigera*. Dalla Torre ascribes the breeding of *Holocremnus errabundus* from *Lema merdigera*, L., to Rondani (Cat. Hym., iii, 87).

126. *Cryptocephalus quinquepunctatus*, Har.*

In Ann. Soc. France, 1869, p. 20, M. Tappes records rearing a ♂ *Hemiteles pedestris* from *Cryptocephalus duodecimpunctatus*.

126*a*. CHLAMYS PLICATA, Fab.*

Tetrastichus chlamytis is described by Ashmead (Trans. Amer. Ent. Soc., 1896, p. 234) as parasitic upon this species; as also is *Psilocera* (*Metopon*) *rufipes*, Ashm. (*l. c.*, p. 229).

127. *Timarcha tenebricosa*, Fab.

Bignell's record, already cited, is not from Devonshire, as would appear from his inclusion of this species in his "List," but refers to the same individual of *T. tenebricosa* as is cited by him at E. M. M., 1891, p. 169: From a specimen of this perfect beetle taken at Land's End on March 30, 1891, forty-one larvae emerged the following day, of which twenty-three were already enclosed in slight white cocoons; the remainder died in the larval state; on

May 1 and following days nineteen *Perilitus falciger* attained perfection. One ♀ *Euphorus pallidipes*, Curt., was bred from a perfect specimen of this beetle, together with many pupae of presumably the same parasite by Donisthorpe in June, 1908, in London.

129. *Chrysomela graminis*, Linn.

Dalla Torre tells us (Cat. Hym. Chal., 59) that Rondani has ascertained the host of *Pteromalus gallarum*, Fonsc. = *Eulophus chrysomelae*, Nees, to be *Chrysomela graminis*, L.

[135. *Prasocuris Phellandrii*, Linn.

No hymenopterous parasite is yet known to us upon this species. *Dele* our former article upon it; and cf. *Hypera arundinis*, post.]

136. *Galerucella calmariensis*, Linn.

Walker says (Ent. Mag., 1838, p. 54) of *Encyrtus*—recte *Homalotylus—flaminius*, Dalm.: "Reared at Paris, from the chrysalis of *Galeruca Calmariensis*, by the Comte de Castelneau." He makes no mention of its attack on *Coccinellae* (*cf.* No. 16, *ante*), nor records it as British.

136*a*. GALLERUCELLA LUTEOLA, Müll.*

One wonders what was Rondani's inadequately described Chalcid, *Oomyzus gallerucae*, which he records (Bull. Comm. Agrar. Parma, 1870, p. 140) as having been bred from the eggs of *Galeruca xanthomelaena*, Schr., in Italy (*cf.* also Bull. Soc. Ent. Ital., 1877, p. 191).

136*β*. GALERUCELLA VIBURNI, Payk.

Kawall has described under the name *Pteromalus octonus* (Stett. Ent. Zeit., 1858, p. 57) a Chalcid, which he bred in Russia from *Galeruca viburni*.

136*γ*. GALERUCELLA LINEOLA, Fab.

137*a*. AGELASTICA ALNI, Linn.

Dalla Torre ascribes (Cat. Hym., iii, 59) to Ratzeburg the breeding of *Mesochorus thoracicus*, Grav., from both these beetles.

138*a*. PHYLLOTRETA ZIMMERMANNI, Crotch.*

Pleurotropis phyllotretae has been described by Riley (Rep. Ent. Dept. Agric., 1884, p. 307) in both sexes from this species in Missouri.

139. *Psylliodes dulcamarae*, Koch.

Goureau also bred from *Haltica dulcamarae* the Braconid *Alysia nitidulator*, Gour., *Pteromalus communis*, Nees, and *Platigaster caudatus*, Gour., according to Dours (Cat., pp. 86, 104, 115).

139*a*. MICRORHOPALA XERENE, Newm.*

Tetrastichus microrhopalae, Ashm., is recorded by him (Trans. Amer. Ent. Soc., 1896, p. 234) from this species.

139*β*. ODONOTA SUTURALIS, How.*

Howard records from this species his *Trichogramma odonotae* (Entom. Amer., 1885, p. 117).

139*γ*. ODONOTA SCUTELLARIS, Oliv.*

The same author describes his *Spilochalcis odonotae* (Descrip. N. Amer. Chalcid., p. 7) as preying upon this species. *Cf.* also Entom. Amer., 1885, p. 117.

139*δ*. ODONOTA (UROPLATA) NATURALIS, How.*

A Chalcid, *Sympiesis uroplatae*, Howard, is recorded by him (Entom. Amer., 1885, p. 117) from this Coleopteron.

139*ε*. HISPELLA WAKKERI.*

Zehntner gives (Bladboorders Suikerriet Java, 1896) his *Eulophus femoralis* as preying upon this Cryptostomid in Java.

141. *Cassida seladonia*, Gyll.

Perris is also said by Dours (Cat., 97, 110) to have bred *Macroneura maculipes*, Walk., and *Tetrastichus orsidice*, Walk.—and Rondani, by Dalla Torre (Cat. Chal., 278), *Eupelmus urozonus*, Dalm.—from the same host.

141*a*. CASSIDA EQUESTRIS, Fab.

From this species Dours says (Cat., 105) that Perris bred *Elachestus dimidiatus*, Walk., in France.

141*β*. CASSIDA NEBULOSA, Linn.

"M. Guérin says one which was not transformed to a pupa produced, on 25th of July, from the middle of the back, thirty-nine very little *Chalcidites*, black with yellow legs, the eggs of which had been deposited by the mother upon the living larva.—Annales de la Soc. Ent. de France for 1846, page lxxi" (Curtis, F. I., 395).

141*γ*. CASSIDA RUBIGINOSA, Müll.*

Rondani is said to have bred *Tetracampe* (*Pteromalus*) *galerucae*, Fonsc., from this species in Italy, by Dalla Torre (Cat. Chal., 86).

144*a*. HYMENORUS DOUBLIERI, Muls.*

Bridgman and Fitch say (Entom., 1884, p. 180) that the anomalous Ophionid Ichneumon, *Nototrachys foliator*, Fab., has been bred from this species by Perris, according to Giraud.

144*β*. OMOPHLUS COERULEUS, Fab.*

144*γ*. OMOPHLUS DISTINCTUS, Cast.*

M. P. Lesne in his paper "Sur un Braconide du genre *Perilitus*, Nees" (Ann. Soc. Fr., 1892, p. 305) recounts the parasitism of his new *P. omophli* upon these two species of Heteromera in Algeria.

146. *Orchesia micans*, Panz.

Morley (Ichn. Brit., iii. 223) regards *Lissonota distincta*, Bridg., as undoubtedly parasitic upon this Heteromeron. In describing his *Macrocentrus punctifrons*, Thomson writes: "Utklackt ur *Orchesia micans* vid Ilstorp i Skane." [After *Porizon moderator*, in our first article, *dele* "106": Ratzeburg's *P. moderator* appears to = *Thersilochus caudatus*, Holmgr.]

149*a*. SERROPALPUS.*

From an unidentified species of this Heteromerous genus, Erné records (Mitt. Schweiz. Entom. Ges., 1876, p. 518) the breeding of *Rhyssa persuasoria*, Linn.; but we suspect some error here, since this parasite has hitherto only been raised from Siricidae in Europe.

150*a*. PYTHO DEPRESSUS, L.

Professor Beare has given me two ♀♀ *Ichneumon confusorius*, Grav., which he took on April 1, 1907, at Aviemore, beneath the bark of a fallen Scots fir among larvae of this beetle. No association was, however, established, and the parasite was probably no more than passing the winter in its normal hibernaculum.—(C. M.)

150*β*. MORDELLA.

Thomson writes (Opusc. Ent., 2229) of *Microdus calculator*: "Funnen vid Ringsjön i Skane, der den träffades på stubbar hvarur *Mordella* flögo ut."

151*a*. MORDELLISTENA PARVULA, Gyll.

Ascogaster armatus, Wesm., and *Entedon zanara*, Walk., are both said to have been bred by Perris from *M. inaequalis*, by Dours (Cat., 78, 109).

156. *Attelabus curculionoides*, Linn.

Chactostricha (*Ophioneurus*) *signata*, Ratz., is also given as preying upon this species by Dalla Torre (Cat. Chal., 4).

156*a*. ATTELABUS BIPUSTULATUS, Schönh.*

Howard tells us in his Descriptions of North American Chalcids (p. 19) that *Aphycus annulipes*, Ashm., has been raised in Florida from this weevil.

157. *Byctiscus betuleti*, Fab.

"Dr. Filippi (Annals and Magazine of Natural History, 1852) observed in certain eggs of *Rhynchites betuleti* a small parasite like an infusorium, provided with a tail,

which it moved briskly with a lashing motion. No organs could at first be seen in this animalcule, but a small vesicle soon appeared therein, increased in size and finally developed itself into the larva of one of the *Pteromalidae*" (Ent. Weekly Intelligencer, 1857, p. 183, *et lib. cit.*, ix, ser. ii, pp. 461–464, pl. xvi A: "Upon the Mode of Generation of a Hymenopterous Insect of the Family of the *Pteromalidae*"); this was a hyperparasite, bred at Turin in some numbers. *Sigalphus caudatus* has also been found to prey upon this host by Goureau (Dours, Cat., 77).

161. *Apion apricans*, Herbst.

Mayr bred his *Holaspis apionis*, as well as *Eurytoma salicis*, Walk. = *gibba*, Boh., from this species in Germany and Austria (Verh. z.-b. Ges., 1874, p. 84, *et* 1878, p. 303). And *Pteromalus pione*, Walk., Dours records (Cat., 104) as attacking it in France on Goureau's authority. "It appears that M. Guérin bred, either from the larvae or pupae of *A. apricans*, the minute fly called by Haliday *Calyptus*, the *Eubazus macrocephalus* of Nees. [Described.] This parasite does not seem to be exempt from persecution, for M. Guérin found with the *Eubazus* a beautifully coloured fly, called by Walker *Petromalus* (sic) *pione*, which is suspected to be parasitic upon the *Eubazus*" (Curtis, F. I., 481). Mayr says of *Eurytoma salicis* (*l. c.*, p. 332): "I have often bred this species from the faded heads of *Trifolium pratense*, in which *Apion trifolii* and *fagi* — identified by Herr Ludwig Millar — lived; Dr. Reinhard obtained it from clover heads from Saxony, in which *Apion apricans* lived."

162. *Apion bohemani*, Thoms.

Three specimens of a new species of the Chalcididous genus *Eurytoma* have been described as also attacking this species by Mayr (Verh. z.-b. Ges., 1878, pp. 303 *et seqq.*) under the name *E. ononis* in Austria; he bred them from pods of *Ononis spinosa*, in which larvae of *Apion ononidis* were living.

165. *Apion loti*, Kirby.

Mayr bred (Verh. z.-b. Ges., 1878, p. 303) *Eurytoma salicis*, Walk. = *gibba*, Boh., in Lower Austria; he says:

"Not seldom this species is found as parasitic upon *Apion loti* in the pods of *Lotus corniculatus*; I received from Walker a pair under the name *E. mucianus*."

166. *Apion rufirostre*, Fab.

Dours adds (Cat., 103) that he has also raised *Pteromalus tenuis*, Walk., from *A. rufitarse*.

167. *Apion trifolii*, Linn.

Eurytoma salicis, Walk. = *gibba*, Boh., has also been bred from this weevil by Mayr (Verh. z.-b. Ges., 1878, pp. 303 *et seqq.*) in Lower Austria.

173*a*. APION GENISTAE, Kirby.

Perris has found *Tetrastichus spartii*, Först., to be parasitic upon this species in France (Dours, Cat., 110).

173*β*. APION SCUTELLARE, Kirby.

Entedon Busiris, Walk., is given by Dours (Cat., 109) on Perris' authority as parasitic on *A. scutellare*; and *Eulophus ulicis* (*l. c.*) as having been bred by Goureau from the synonymous *A. ulicicola*, Perr. (*cf.* Ann. Soc. Fr., 1840, p. 91).

173*γ*. APIUM MARCHICUM, Herbst.

Dours (Cat., 108) says *Entedon Pharnus* has been found by Perris to attack this weevil.

173*δ*. APION LAEVIGATUM, Kirby.

The same author (*l. c.*, 104) instances *Pteromalus viridulus*, Walk., as parasitic upon this beetle also, whence it was bred in France by Perris, together with (p. 115) *Platigaster Chrysippus*, Walk., and (p. 116) *Belyta rufopetiolata*, Nees.

173*ε*. APION ULICIS, Först.

Semiotus brevipennis, Walk., has been bred by Goureau from this species (Dours, Cat., 102); and, from the same host, *S. apionis* is also described (Ann. Soc. Fr., 1847, p. 252) by Goureau.

173ζ. APION AENEUM, Fab.

Both *Sigalphus striatulus*, Nees, and *Pteromalus larvarum*, Nees, have been bred, says Dours (Cat., 77, 104), from this weevil by Goureau in France.

173η. APION PUBESCENS, Kirby.

Perris has bred *Eupelmus urozonus*, Dalm., and *Eulophus Alaparus*, Walk., from *Apion salicis*, Gyll. (Dours, Cat., 89, 106).

173θ. APION FUSCIROSTRE, Fab.

From this species is somewhat doubtfully recorded the Chalcid, *Microterys* (*Encyrtus*) *mitratus*, Dalm., by Mayr (Verh. z.-b. Ges., 1875, p. 710).

173ι. APION ASTRAGALI, Payk.

Mayr appears to have bred *Eurytoma salicis*, Walk. = *gibba*, Boh., from this species (Verh. z.-b. Ges., 1878–9, p. 332) in Lower Austria: "I obtained one male from a pod of *Astragalus glycyphyllos* in which probably larvae of this beetle had lived."

173κ. APION RADIOLUS, Kirby.

We may conjecture, since this is the only Coleopteron indicated by Kaltenbach as feeding on *Althaea*, that this was the host from which the ten specimens of *Eurytoma curculionum* were bred by Mayr in Austria (Verh. z.-b. Ges., xxviii, p. 308) out of the stems of *A. rosae*.

180. *Hypera rumicis*, Linn.

From this host, M. Decaux also records (Feull. Jeun. Natural., 1888, p. 97), *Eulophus ramicornis*, Fab.; and Osborne has described (E. M. M., xvi, p. 17) the cocoons of "two species of *Ichneumonidae*."

181. *Hypera polygoni*, Linn.

Brischke is said by Dalla Torre (Cat. Hym., iii, 243) to have recorded the parasitism of *Bassus* (*Prometheus*) *festivus*, Fab., upon *Phytonomus polygoni*.

182. *Hypera plantaginis*, DeG.

Dalla Torre refers (*l. c.*, 661) to Ratzeburg having bred *Hemiteles pedestris*, Fab.—possibly the same species as was bred by Curtis, since the latter does not specify it—from this weevil.

182*a*. HYPERA VARIABILIS, Herbst.

Mr. E. A. Butler has bred *Mesochorus gibbulus*, Holmgr., hyperparasitically through *Limneria lugubrina*, Holmgr., from this species (Entom., 1883, p. 67).

182*β*. HYPERA ARUNDINIS, Payk.

[*Cf.* No. 135, our article upon which belongs here.] The raising of *Canidiella quinqueangularis*, Ratz., is ascribed by Dalla Torre (Cat., iii, 110) to Kriechbaumer; but Schmiedeknecht distinctly states (Opusc. Ichn., xxi, 1909), 1677: "Die Examplare welche Ratzeburg beschrieber hat stammten von Brischke: dieser hatte sit aus den Larven von *Phytonomus arundinis* gezogen."

182*γ*. HYPERA TIGRINA, Boh.

I have examined single females of *Pimpla nucum*, Ratz., with the terebra aborted, and *Pezomachus intermedius*, Först., possibly parasitic upon it—since the two pupae whence they emerged were analogous—bred by E. C. Bedwell at St. Margaret's Bay, in Kent, from this beetle in September, 1908.

184*a*. LIXUS POLLIONIS, Laich.*

Pteromalus perilampoides, Walk., is said by Dours (Cat., 103) to have been bred from *L. onorpordi*, Besser MS., by Perris in France.

185. *Lixus iridis*, Oliv.*

M. l'Abbé Pierre details the parasitism (Revue Linnéenne, 1903, Nos. 220–4) of *Rhopalicus brevicornis*, Thoms., upon the eggs and of a species of *Tetrastichus*, Hal. = *Cirrospilus*, Walk., upon the larvae, pupae and imagines of this beetle.

188. *Pissodes notatus*, Fab.

Besides the species already mentioned, Dours gives (Cat., 72 *et* 102) *Bracon multiarticulatus*, Ratz., and *Cheiropachus tutela*, Walk., as parasites of this destructive weevil; Dalla Torre (Cat. Hym., iii, 436) adds *Pimpla instigator* upon Rondani's authority and its variety *processionеae* upon that of Ratzeburg, but these more probably emerged from their usual Bombyx. Giraud's record of the parasitism of *Cocloides initiator*, Nees, has more recently been confirmed by M. Carpentier (Marshall, Bracon. d'Europ., iii, 119). We have just seen, in December, 1910, two females of *Alloderus semirugosus*, Nees (*cf.* Entom., 1910), bred by Mr. G. H. Grosvenor last June from young *Pinus sylvestris* along with this beetle in Windsor Forest.

191*a*. PISSODES VALIDIROSTRIS, Gyll.*

Dr. Mayr records (Verh. z.-b. Ges., 1878, pp. 300 *et seqq.*) the parasitism of his *Eurytoma Wachtli* upon this species; he says a single ♂ was bred in February from the weevil in branches of *Pinus nigricans* at Bruhl, near Vienna.

193. *Orchestes alni*, Linn.

Goureau also found *Pteromalus daimenes*, Walk., and *Entedon divitiacus*, Gour., to prey on this weevil (Dours, Cat., 104 *et* 108); from which Rondani bred his *Sparthiophilus orchesticida* (Bull. Soc. Ent. Ital., 1877, p. 198).

195. *Orchestes fagi*, Linn.

Opius straminator, Gour., and *Entedon distinctus*, Gour., were both bred from this species (Dours, Cat., 85 *et* 109) in France by their author.

200*a*. RHAMPHUS FLAVICORNIS, Clair.

Rondani is said to have bred the British Chalcid, *Cirrospilus vittatus*, Walk., from this insect by Dalla Torre (Cat. Chal., 84); and another of our species, *Eunotus cretaceus*, Walk., has also been raised from it by Geraud (*lib. cit.*, 158).

200β. ERIRRHINUS.

Dours (Cat., 102) tells us that Goureau has found his *Semiotus stramincipes*, and (p. 104) *Pteromalus elongatus*, Ratz., to be "parasites de divers *Erirrhinus*."

200γ. TYCHIUS SEMISQUAMOSUS, Lec.*

From California, Ashmead has described a Chalcid, *Tanaostigmodes tychii*, from this weevil (Proc. Ent. Soc. Washington, 1896, p. 19).

201. *Miarus campanulae*, Linn.

From *Cleopus Campanulae*, Linn., Mayr also records (Verh. z.-b. Ges., 1878, pp. 301 *et seqq.*) his *Eurytoma curculionum* in Lower Austria; seventy-three specimens emerged during August and September from the seeds of *Campanula rapunculoides*, Linn., in which this host was living, and ten more in September and May from stems of *Althaea rosae* (*cf.* ante No. 173κ).

202. *Gymnetron antirrhini*, Payk.

Eurytoma plumata, Illig. = *aterrima*, Schr., has also been bred from this species, says Dours (Cat., 96), by Perris in France.

205. *Gymnetron villosulus*, Gyll.

Nees (Mon., ii, 423) synonymises *Diplolepis curculionoides*, Bouché, with his own *Pteromalus seniculus* and adds "Habitat solitaria in larvis *Gymnaetri Villosuli*." *Bracon atrator*, Nees, has been also found to prey upon this species by Goureau (Dours, Cat., 73).

206. *Gymnetron teter*, Fab.*

Besides *Pimpla gymnetri*, Dalla Torre instances (Cat. Hym., iii, 448) *P. ruficollis*, Grav., as attacking it; but he presents no authority for the statement.

207. *Gymnetron asellus*, Grav.*

From this species, Mayr also records (Verh. z.-b. Ges., 1878, pp. 301 *et seqq.*) his *Eurytoma curculionum* in Lower Austria: three specimens were bred by Oberforster Wachtl, probably from *Verbascum* stems.

208*a*. GYMNETRON LYCHNITIDIS.*

Pteromalus transiens, Rondani, *nec* Walk., has been recorded from a weevil under this name by its author in Italy (Bull. Soc. Ent. Ital., 1877, p. 196).

209. *Mecinus collaris*, Germ.

"I have bred *Mecinus collaris* from galls of *Plantago maritima*, which are very abundant here (Southsea), though the beetle is rare, as 99 out of every 100 galls contain Hymenopterous parasites" (Moncreaff, E. M. M., 1870, p. 81). "*Micromelus pyrrhogaster*, Walk.—I bred a male and female of this interesting Chalcid from *Mecinus collaris* galls, on the flowering stems of *Plantago maritima*. I have no doubt but that they were parasitic on these small beetles" (Bignell, Entom., 1884, p. 46). "I had some flower stems of *Plantago maritima*, all swollen and gouty-looking by the galls of *Mecinus collaris*; in some stems a cicatrix was visible, where probably the egg had been inserted; others showed a hole from which the weevil had evidently emerged. The stems were tunnelled up the centre and divided into compartments, each containing a larva, pupa or beetle, or larva or pupa of the parasite. These last were black, shining, little pupae; in some cases the cell contained two larvae. One beetle larva contained a large fat white Chalcid larva. In later stems there were hardly any beetles or pupae of beetles, but only Chalcid pupae. These were head upwards in the cavity and slightly attached at the lower end to the shrunken larva-skin. There were as many as four or five cavities in a stem, often right up into the flowering portion. This was in August and the Chalcid pupae remained in the dry and dead stems through the winter, the flies emerging in the following May and June. I should think quite seventy-five per cent. of the beetles were destroyed by this Chalcid" (H. J. Charbonnier, of Bristol, *in lit.*, Jan. 3, 1908. The parasite in this case is a fine green *Elachistid*.—C. M.)

210. *Anthonomus pomorum*, Linn.

Dours (Cat., 69) says Goureau has bred *Pimpla graminellae*, Grav., from this host; as well as (p. 73) *Bracon variator*, Nees.

210*a*. ANTHONOMUS MESPILI.*

The same observer has raised (*lib. cit.*, 73) *Bracon intercessor* from this species, as well as (pp. 77, 85) *Sigalphus pallidipes*, Gour., and *Opius pygmaeator*, Nees.

210*β*. ANTHONOMUS SIGNATUS.*

From this host at Washington, Ashmead has described a new Chalcid, *Catolaccus anthonomi* (Insect Life, 1893, p. 185); and, a page later, a second parasite from the same locality, *C. incertus*, Ashm.

212*a*. NANOPHYES SICULUS, Schh.*

Cirrospilus (*Asecodes*) *Chabrias*, Walk., is given on the authority of Perris (Dours, Cat., 106) as a parasite of *Nanophies siculus*.

213. *Cionus scrophulariae*, Linn.

Bignell's record of *Pezomachus instabilis* confirms an earlier one, to the same effect, instanced by Rondani. Dours also gives (Cat., 108) *Entedon variolosus*, Gour., on its author's authority as a "parasite de la larve du *Cionus scrophulariae*" in France. It is just possible that this may be synonymous with *E. cioni*, described from the same host by Thomson (Hym. Scand., v. 246), or with *E. cionobius*, Thoms. (*lib. cit.*, 247).

215. *Stereonychus fraxini*, Deg.*

Pezomachus Gravenhorsti, Fonsc. (*nec* Ratz.)—whatever its present name—was recorded by its author (Ann. Soc. Fr., 1852, p. 428) to also prey upon this beetle.

215*a*. TYLODERMA FOVEOLATUM, Say.*

Ashmead has described two Chalcid flies as preying upon this American weevil; these are *Catolaccus tylodermae*

(Bull. Ohio Exp. Stat., 1894, p. 161), bred by Chittenden, and *Eurytoma tylodermatis* (Trans. Amer. Ent. Soc., 1896, p. 218).

219*a*. COELIODES ACEPHALUS, Say.*

Under the name *Catolaccus coeliodis*, Ashmead has described (*loc. cit.*, p. 226) a new Chalcididous parasite of this species from Virginia.

220. *Ceuthorrhynchus*[1] *assimilis*, Payk.

Rondani also bred his Chalcid, *Schitrichus* (*Encyrtus*) *ceuthorrhynchi* (Bull. Soc. Ent. Ital., 1872, p. 207; *cf. loc. cit.*, 1877, p. 196) from this host.

222. *Ceuthorrhynchus pleurostigma*, Marsh.

Diospilus oleraceus, Hal., and *Sigalphus obscurellus*, Nees, bred from this weevil, "one of these underwent its transformation within the swellings caused by the beetle-larva, the other came out and formed cocoons in the earth" (Meeting Ent. Soc., March 5, 1884). *Alysia truncator*, Nees, is also said by Dours (Cat., 86) to have been bred from this species by Goureau. *Cf.* also Guérin-Méneville, Bull. Soc. Fr., 1845, p. xxxiv.

224*a*. CEUTHORRHYNCHUS NAPI, Schh.*

Porizon moderator, Linn., is said by Dours (Cat., 63) to have been raised from *Ceuthorrhynchus napi* by Goureau.

224*β*. CEUTHORRHYNCHUS ASPERULUS, Schh.*

From this species Dours says (*loc. cit.*, 103) Perris has bred *Pteromalus deplanatus*, Walk., *Eulophus Hegemon*, Walk. (p. 107), and (p. 108) *Entedon hippia*, Walk.

224*γ*. CEUTHORRHYNCHUS GLAUCUS, Schh.*

Dours tells us (Cat., 104) that Goureau has bred *Pteromalus fulgidus*, Först., from this weevil, together with (p. 107) *Eulophus viridarius*, Gour.

[1] Dalla Torre (Cat. Hym., iii, 143) gives *Campoplex gracilis* as parasitic upon a member of this genus on Ratzeburg's authority. This appears to be *in errore; cf.* No. 216, *supra*.

224δ. CEUTHORRHYNCHIDIUS POSTHUMUS, Germ.

Rondani has bred the British Chalcid, *Eulophus Hegemon*, Walk., in Italy from *Amalus asperulus*, Boh. = *pumilio*, Gyll., according to Dalla Torre (Cat. Chal., 62); but *cf.* 224, *supra*.

225. *Baris laticollis*, Marsh.

Bracon baridii was first described by Rev. T. A. Marshall (André, 1897, p. 80) from specimens bred from *Baridius laticollis*.

226. *Baris chlorizans*, Germ.

Two pairs of *Bracon glaphyrus*, Marsh., were bred from larvae of this species toward the end of July and beginning of August, at Florence in Italy (Bracon. d'Europ., iii, 73).

227a. BARIS PICINUS, Germ.*

From *Baridius picinus* has been raised, according to Dours (Cat., 108) *Entedon Pharnus*, Walk., by Perris.

228. *Balaninus nucum*, Linn.

A Pimplid, allied to *P. nucum*, Ratz., has been bred by Dr. Rudow from the same host and named by him (Ent. Nachr., 1883, p. 232, ♂) *Ephialtes balanini*.

228a. BALANINUS VENOSUS, Grav.

His *Orthocentrus nigristernus* (*O. incisus*, Grav., var.) is recorded to prey in Italy upon *B. glandium* by Rondani (Bull. Soc. Ent. Ital., 1877, p. 192); as well as his *Odontomerus glandarius* (*lib. cit.*, p. 189).

228β. BALANINUS PISTACIPERDA, Rond.*

The same author has described (*lib. cit.*, p. 180) a Chalcid, *Eurytoma pistaciae*, which he bred from a beetle of the above name in Italy.

228γ. BALANINUS TEREBINTHIVORUS, Rond.*

And from this species he also brought forward a new Italian parasite, *Eurytoma terebinthi* (Bull. Soc. Ent. Ital., 1877, p. 180).

228δ. BALANINUS NASICUS, Say.*

Riley has recorded the emergence of the Proctotrypid, *Trichacis rufipes*, Ashm., from this species in North America (Dalla Torre, Cat. Proct., 481).

230. *Balaninus villosus*, Fab.

Ophion nutritor, Fab., Piez., 139, is now placed in the genus *Diaparsis*, Först.

230α. HETERONUS QUADRICOLLIS, Fairm.*

Kieffer remarks (Proct., i. 236) upon the parasitism of *Apenesia parasitica*, Smith, upon Madagascaran palm weevil.

230β. CALANDRA ORYZAE, Linn.

"It is evident they are preyed upon by a parasitic hymenopterous insect, for in one of the grains I detected an apterous, blackish-green specimen, with rufous legs, but it was too much mutilated to draw from. I am pretty certain it is the same species, or closely allied to one, named *Meraporus graminicola* (Curtis' Guide, genus 630f.), which we often find in this country in July" (Curtis F. I., 322); "one of the Diplolepidae" (*lib. cit.*, p. 338, pl. K, fig. 19, ♀). Can this refer to *Pteromalus Calandrae*, Howard (Rep. Ent. U. S., 1880–81, p. 273), which was raised by him from the same host in Texas; or to *P. oryzinus*, Rondani (Bull. Soc. Ent. Ital., 1874, p. 131 *et* 1877, p. 195), which the latter also bred from it in Italy?

230γ. CALANDRA GRANARIA, Linn.

Possibly one or other of the above parasites is synonymous with Cameron's Indian *Pteromalus oryzae* (Mem. Manchester Soc., 1891, p. 184), which was bred from the

present species ; as also, says Reinhard (Berl. Ent. Zeit., 1857, p. 75), was *Cerocephala cornigera*, Westw. But *cf.* Fitch (Entom., 1879, p. 47, *et* 1881, p. 21), who considers *Sciatheras trichotus*, Ratz., to be the parasite of *Calandra* and to be distinct from *Cerocephala*, with which Förster mingled it (Morl., Cat. Brit. Chal., 1910, p. 28).

231. *Magdalis.*

A female *Eurytoma*, bred by Oberforster Wachtl from twigs of *Pinus nigricans* infested by a species of this genus near Vienna in February, is suggested by Mayr (Verh. z.-b. Ges., 1879, p. 322) as synonymous with Ratzeburg's *E. abieticola* (*cf.* No. 234, *post*) ; he says it differs from his *E. auricoma*, which it closely resembles, in its white and more densely pubescent face, testaceous, intermediate coxae, and centrally deeply impressed metanotum.

[*Dele Cryptus echthroides* from our original article and *cf.* No. 234.]

234. *Magdalis violacea*, Linn.

Cryptus (*Helcostizus*) *echthroides*, Ratz., though not assigned to any particular host species of *Magdalis* at Ichn. d. Forst., iii, 251—copied by us (Trans. Ent. Soc., 1907, p. 56)—is relegated at *lib. cit.*, iii, 138, to *M. violacea* (as pointed out by Vollenhoven, Pinac., 65).

234*a*. MAGDALIS ARMICOLLIS, Say.*

A new species of the genus *Eurytoma* has been described as preying upon the present by Ashmead (Trans. Amer. Ent. Soc., 1894, p. 326), under the name *E. magdalidis*, from Virginia.

234*β*. MAGDALIS RUFA, Germ.*

Dr. Mayr records (Verh. z.-b. Ges., 1878, pp. 300 *et seqq.*) the parasitism of his *Eurytoma Wachtli* upon this species ; he says the latter bred in the spring three ♀♀ and one ♂ from *M. rufa* in the branches of *Pinus nigricans* at Bruhl, near Vienna.

235. *Rhopalomestes tardyi*, Curt.

Chitty took this species of Pimplid, already recorded, flying round an ash tree full of the present weevil near Plymouth in June, 1907, and shortly afterwards Mr. Keys sent me much of the wood from the same tree, containing larvae of *R. tardyi* and dead *Odontomerus dentipes*. Both host and parasite emerged thence during the following August (*cf.* Morl., Ichn. Brit., iii, 11).

238. *Scolytus destructor*, Oliv.

Cf. also Wesmael (in Bull. Ac. Brux., 1838, p. 220, *et* Revue Zool., 1838, p. 144), "Notice sur le *Bracon initiator* l'ennemi du Scolytus destructor"; as well as Guérin-Méneville, Bull. Soc. Fr., 1846, pp. 969–77.

240. *Scolytus multistriatus*, Marsh.

We found *Cheiropachys colon*, Linn., actually in the burrows of this borer, among the pupae of the latter, in felled elm trunks at Blackwater, I. W., in June, 1907. A ♀ of *Coeliodes scolyticida*, Wesm., was captured in my garden at Monk Soham, Suffolk, on June 27, 1908; it was investigating borings in an ancient, thick timber of a summer-house, more likely to be tenanted by *Anobium* than *Scolytus*.—(C. M.)

243. *Scolytus rugulosus*, Ratz.

Eurytoma rufipes, Walk., and *Cheiropachus quadrum*, Walk. = *colon*, Linn., have also been bred from this borer by Perris in France (Dours, Cat., 96, 102). Possibly one of the Chalcids already mentioned is synonymous with Ashmead's ♀ *Tetrastichus scolyti*, described by him from this species (Trans. Amer. Ent. Soc., 1894, p. 343; cf. *Platygerrhus scolyti*, Ashm., *lib. cit.*, p. 335); or with his *Eurytoma crassineura* (*lib. cit.*, p. 324).

243a. LOGANIUS FICUS, Schwarz.*

Schwarz is said to have bred *Cerocephala scolytivora*, Ashm., from this beetle by the latter (Proc. Ent. Soc. Washington, 1894, p. 33).

244. *Hylastes palliatus*, Gyll.

In Britain, our first record is a Chalcid found in the burrows of this beetle by Donisthorpe at Nethy Bridge, late in July, 1907.

247. *Hylesinus fraxini*, Panz.

Goureau also raised his *Eurytoma fulvipes* from this borer in France (Dours, Cat., 97); and Mayr says (Verh. z.-b. Ges., 1879, p. 322) that Oberforster Wachtl bred the former's *Eurytoma auricoma* from the same host in February and April near Vienna, adding that in the museum there is a pair presented by Dr. Förster and called by him *Eurytoma fraxini*; he suggests that it may be synonymous with *E. abieticola*, Ratz., but is sceptical upon the point (*cf.* No. 234, *supra*). A ♂ and three ♀♀ of *Bracon longicaudis* were presented to the British Museum in 1907 by Rev. G. Crawshay, who had bred them from the cocoons of this beetle at Leighton Buzzard.

248*a*. HYLESINUS BICOLOR, Brull.*

From this borer, Perris has bred *Encyrtus megacephalus*, Walk., *Callimome nobile*, Boh., *Pteromalus semiotoides*, Walk., *P. eulophoides*, Walk., *P. pirus*, Walk., and the Proctotrypid, *Sclerochloa fuscicornis*, Westw. (Dours, Cat., pp. 91, 95, 103, 112); the last species has, however, been determined as *Scleroderma Fonscolombei*, Westw., by Kieffer (Proct., i, 234).

248*β*. HYLESINUS THUYAE, Perris.*

Dours says (Cat., 110) that its author raised from this beetle *Tetrastichus deipyrus*, Walk.

250. *Phloeotribus oleae*, Fab.*

From this species also has been raised in Italy, Rondani's *Eurytoma Baryaglii* (Bull. Soc. Ent. Ital., 1877, p. 179).

252. *Hylurgus minor*, Htg.

Wachtl bred his new Chalcid, *Heydenia excellens* (Wien. Ent. Zeit., 1889, p. 89), from the same host in Austria;

and Mayr says (Verh. z.-b. Ges., 1879, p. 322) that he also bred from it on *Pinus nigricans* in January and February the latter's *Eurytoma auricoma*, near Vienna.

253. *Hylurgus piniperda*, Linn.

Cooper's parasitism was entirely supposititious (*cf. loc. cit.*) and he gives *C. pulchellus* as a MS. name of Walker. Perhaps one of the Chalcids already mentioned is synonymous with Hartig's inadequately described *Diplolepis hylesinum* (Forstl. Conversationslex. 1834, p. 198), which he bred from the same host in Germany. Dalla Torre gives no authority for his statement (Cat. Hym., iii, 604) that this species is also attacked by *Spilocryptus incubitor*, Ström., which is most improbable. We have seen a ♀ of *Bracon minutator*, Fab., bred by Mr. G. H. Grosvenor at Vaumoise, early in October, from galleries of this beetle.

253*a*. PHLOEOTRIBUS FRONTALIS, Oliv.*

A Chalcid, named by him *Secodes phloeotribi*, has been bred by Ashmead from this borer in Virginia (Trans. Amer. Ent. Soc., 1896, p. 233), together with his *Cecidostiba dendroctoni* (*l. c.*, 1894, p. 338) and his *Eurytoma phloeotribi* (*l. c.*, p. 326).

254*a*. PHLOEOSINUS DENTATUS, Say.*

A new species of the genus *Eurytoma* has been described as preying upon this beetle by Ashmead (Trans. Amer. Ent. Soc., 1894, p. 327) in Virginia, under the name *E. phloeosini*.

255*a*. POLYGRAPHUS RUFIPENNIS, Kirby.*

From this species Ashmead has bred in Virginia both his *Cecidostiba dendroctoni* and his *C. polygraphi* (Trans. Amer. Ent. Soc., 1894, p. 338).

255*β*. HYPOTHENEMUS ERUDITUS, Westw.

Chittenden has observed that *Cephalonomia hyalinipennis*, Ashm., attacks this cosmopolitan species in Florida (Kief., Proct., i, 237).

260*a*. PITYOPHTHORUS CONSIMILIS, Lec.*

From Florida, Ashmead has described (Proc. Ent. Soc. Washington, 1894, p. 32) a Chalcid, parasitic upon this borer, under the name *Cerocephala pityophthori*; as well as a Proctotrypid, *Aradophagus fasciatus* (Bull. U. S. Nat. Mus., 1893, p. 166) from the same locality.

260*β*. PITYOPHTHORUS QUERCIPERDA, Swz.*

260*γ*. BRACHYRHYNCHUS GRANULATUS, Say.*

From these two species, also, *Aradophagus fasciatus* has been bred in Florida (*l. c.*).

263. DRYOCAETES VILLOSUS, Fab.

We have no British records of parasitism; but Grosvenor bred a ♂ *Chalcid* from it in June, 1908, at Bagley.

265*a*. TOMICUS SEXDENTATUS, Börn.

Mayr brings forward from Lower Austria (Verh. z.-b. Ges., 1878, pp. 301, 304, 321) *Eurytoma auricoma*, which he says was bred from *Hylurgus minor*, *Hylesinus fraxini* and the present species by Oberforster Wachtl, from *Pinus nigricans*, near Vienna.

266. *Tomicus laricis*, Fab.

Perris also bred *Amblymerus mirus*, Walk., from *Bostrichus laricis* in France (Dours, Cat., 102).

267. *Tomicus typographus*, Linn.

Possibly one or two of the Chalcids already instanced as attacking this species are synonymous with Hartig's *Diplolepis bimaculata*, *D. maculata* and *D. corticalis* (Forstl. Conversationslex, 1834, p. 198), all of which he bred in Germany from *Bostrichus octodentatus*, Payk.

269. *Pityogenes bidentatus*, Herbst.

Perhaps one of the Chalcids instanced by Ratzeburg or Giraud is synonymous with Hartig's inadequately described *Diplolepis aeneus* (Forstl. Conversationslex, 1834, p. 197), which he bred from the same host; together with his *D. bidentis* (*lib. cit.*, p. 198).

272. Undetermined Coleoptera.

Cephalonomia myctophila, Kief., has been obtained at Amiens "par M. Carpentier, de bolets ligneux, habités par des larves de petits Coléoptères" (Proct., i, 455). *Campoplex lugens* is given by Dours (Cat., 61) as having been thought by Dr. Giraud to be a "parasite d'un Coléoptère"; which is very improbable.

CLASSIFIED LIST OF PARASITES.

First Supplement.

ACULEATA.

0. Methoca ichneumonides, 0α β

EVANIIDAE.

1. Aulacus striatus, Jur., 75α
2. ,, resutorivorus, Westw., 102β
2α. ,, apicalis, Westw., 72γ

ICHNEUMONIDAE.

3. Ichneumon confusorious, Grav., 150α
4. Hemiteles gyrini, Parf., 7
5. ,, persector, Parf., 7
6. ,, pedestris, Fab., 126, 182
7. Pezomachus comes, Först., 7
8. ,, intermedius, Först., 182γ
9. ,, instabilis, Först., 213
10. ,, Gravenhorsti, Fonsc., 215
11. Spilocryptus incubitor, Ström., 253
12. Cryptus cyanator, Grav., 76
13. ,, viduatorius, Fab., 105
14. ,, echthroides, Ratz., 231, 234
15. Xylophrurus lancifer, Grav., 105
16. Coleocentrus scutellaris, Rudow, 106
17. Perithous mediator, Fab., 75
18. Ephialtes tuberculatus, Fourc., 88
19. ,, heteropus, Thoms., 75
20. ,, irritator, Fab., 94α
20α. ,, iridipennis, Morl., 32δ
21. ,, gracilis, Grav., 90α
22. ,, luteipes, Thoms., 105
23. ,, balanini, Rudow, 228
24. Pimpla inquisitor, Scop., 47
25. ,, sagrae, Voll., 121η
26. ,, nucum, Ratz., 182γ
27. ,, instigator, Fab., 188
28. ,, ruficollis, Grav., 206
29. ,, gymnetri, Ratz., 206
30. ,, graminellae, Grav., 210
31. Rhyssa persuasoria, Linn., 102β, 149α
32. Polysphincta elegans, Ratz., 57
33. ,, lignicola, Ratz., 75
34. Lissonota palpalis, Thoms., 110
35. ,, varicoxa, Thoms., 110

36. Lissonota distincta, Bridg., 146
37. Procinetus decimator, Grav., 108*a*
38. Ischnocerus rusticus, Fourc., 85
39. Xylonomus filiformis, Grav., 72*a*, 79
40. ,, precatorius, Fab., 109
41. ,, rufipes, Grav., 86
42. Xorides caryae, Hartn., 106*a*
43. Odontomerus dentipes, Gmel., 26*a*, 235
44. ,, glandarius, Rond., 228*a*
45. Labena apicalis, Cress., 32*β*
46. Exochus gravipes, Grav., 25*a*
47. Polyclistus femoralis, Fourc., 54
48. Orthocentrus nigristernus, Rond., 228*a*
49. Bassus festivus, Fab., 181
50. Nototrachys foliator, Fab., 144*a*
50*a*. Gausocentrus gyrini, Ashm., 6*a*
51. Campoplex lugens, Grav., 272
52. Holocremnus errabundus, Grav., 123*a*
53. Limnerium lugubrina, Holmgr., 182*a*
54. Canidiella 5-angularis, Ratz., 182*β*
55. Nemeritis gracilis, Grav., 220
56. Pyracmon pectoralis, Kriech., 32
56*a*. Zaleptopygus Obereae, Viereck, 108*β*
57. Porizon moderator, Linn., 146, 224*a*
58. Thersilochus caudatus, Holmgr., 146
59. Diaparsis nutritor, Fab., 230
60. Mesochorus thoracicus, Grav., 137*a*
61. ,, gibbulus, Holmgr., 182*a*

BRACONIDAE.

62. Bracon impostor, Scop., 86, 87
63. ,, multiarticulatus, Rtz., 188
64. ,, atrator, Nees, 205
65. ,, variator, Nees, 210
66. ,, intercessor, Nees, 210*a*
66*a*. ,, minutator, Fab., 253
67. ,, baridii, Marsh., 225
68. ,, glaphyrus, Marsh., 226
69. Bracon longicaudis, Ratz., 247
70. Coeloides scolyticida, Wesm., 240
71. Coeloides Neesii, Marsh., 92
72. ,, initiator, Nees, 188, 238
73. Doryctes striatellus, Nees, 51
74. ,, leucogaster, Nees, 64
75. Atanycolus denigrator, Nees, 32*a*
76. Spathius exarator, Linn., 47, 57
77. Hecabolus sulcatus, Curt., 47, 57
78. Ascogaster armatus, Wesm., 151*a*
78*a*. Alloderus semirugosus, Wesm., 188
79. Sigalphus caudatus, Nees, 157
80. ,, striatulus, Nees, 173*ζ*
81. ,, pallidipes, Gour., 210*a*
82. ,, obscurellus, Nees, 222
83. Apanteles salebrosus, Marsh., 11
84. ,, albipennis, Nees, 34*β*
85. Microdus calculator, Fab., 150*β*
86. Euphorus sculptus, Cress., 13*a*
87. ,, pallidipes, Curt., 127
88. Perilitus omophli, Lesne, 144*γ*
89. ,, falciger, Ruthe, 127
90. Meteorus atrator, Curt., 68
91. Eubadizon macrocephalus, Nees, 161
92. Macrocentrus punctifrons, Thoms., 146
92*a*. Helcon ruspator, Linn., 90
93. Diospilus melasidis, Marsh., 35*a*
94. ,, oleraceus, Hal., 222
95. ,, melanoscelus, Nees, 61
96. ,, dispar, Nees, 61
97. Opius straminator, Goureau, 195
98. ,, pygmaeator, Nees, 210*a*
99. Alysia manducator, Panz., 36*β*
100. ,, nitidulator, Goureau, 139
101. ,, truncator, Nees, 222

CHALCIDIDAE.

102. Diplolepis hylesinorum, Htg., 253
103. ,, bimaculata, Htg., 267
104. ,, maculata, Htg., 267

105. Diplolepis corticalis, Htg., 267
106. ,, aeneus, Htg., 269
107. Spilochalcis odonotae, How., 139γ
108. Perilampus micans, Dalm., 13, 66
109. ,, angustus, Nees, 51
110. Eurytoma aterrima, Schr., 202
111. ,, abieticola, Ratz., 231, 247
112. ,, agrili, Ashm., 34α
113. ,, auricoma, Mayr, 231, 247, 265α
114. ,, Bargaglii, Rond., 250
115. ,, crassineura, Ashm., 243
116. ,, curculionum, Mayr, 173κ, 201, 207
117. ,, fulvipes, Goureau, 247
118. ,, fraxini, Först., 247
119. ,, lycti, Ashm., 67α
120. ,, magdalidis, Ashm., 234α
121. ,, ononis, Mayr, 162
122. ,, phloeosini, Ashm., 254α
123. ,, phloeotribi, Ashm., 253α
124. ,, pictaciae, Rond., 228β
125. ,, rufipes, Walk., 111α, 243
126. ,, salicis, Walk., 161, 165, 167, 173η
127. ,, terebinthi, Rond., 228γ
128. ,, tylodermatis, Ashm., 215α
129. Bruchophagus borealis, Ashm., 110γ
130. ,, Mexicanus, Ashm., 121ζ
131. Systole albipennis, Walk., 121ε
132. Euchrysia maculipennis, Ashm., 32γ
133. Torymus roboris, Walk., 248
134. ,, tarsalis, Walk., 105
135. Holaspis apionis, Mayr, 161
136. Eusandalum Hubbardi, Ashm., 92γ
137. ,, Coquilletti, Ashm., 110α
138. Calosota aestivalis, Curt., 46
139. ,, vernalis, Curt., 57
140. Eupelmus DeGeeri, Dalm., 111α
141. Eupelmus urozonus, Dalm., 141, 173η
142. ,, cyaniceps, Ashm., 121δ
143. ,, atropurpureus, Dalm., 121ε
144. Tanaostigmodes tychii, Ashm., 200γ
145. Microterys mitratus, Dalm., 173θ
146. ,, sylvius, Dalm., 110β
147. Homalotylus terminalis, Say, 16α—η
148. ,, similis, Ashm., 16θ
149. ,, flaminius, Dalm., 136
150. Aphycus annulipes, Ashm., 156α
151. Encyrtus ceuthorrhynchi, Rond., 220
152. ,, "fumifascia, Walk.," 16ζ
153. ,, megacephalus, Walk., 248α
154. Semiotellus brevipennis, Walk., 173ε
155. ,, apionis, Goureau, 173ε
156. ,, stramineipes, Goureau, 200β
157. ,, varians, Walk., 119
158. Metastenus acanthocini, Ashm., 92β
159. Cerocephala pityophthori, Ashm., 260α
160. ,, scolytivora, Ashm., 243α
161. ,, cornigera, Westw., 54, 230γ
162. Sciatheras trichotus, Ratz., 230γ
163. Theocolax formiciformis, Westw., 47
164. Halticoptera breviventris, Först., 121
165. Heydenia excellens, Wachtl, 252
166. Trigonoderus ductilis, Walk., 46
167. Macroneura maculipes, Walk., 141
168. Platygerrhus scolyti, Ashm., 243
169. Micromelus pyrrhogaster, Walk., 209
170. Cheiropachys colon, Linn., 240, 243

171. Cheiropachys tutela, Walk., 46, 188
172. ,, pulchellus, Walk., MS. 253
173. Rhopalicus brevicornis, Thoms., 185
174. Rhoptrocerus mirus, Walk., 266
175. Hetroxys callidii, Ashm., 81α
176. Cecidostiba dendroctoni, Ashm., 253α, 255α
177. ,, polygraphi, Ashm., 255α
178. Meraporus graminicola, Walk., 230β
179. ,, bruchivorus, Ashm., 121δ
180. Endomychobius flavipes, Ashm., 18α
181. Catolaccus anthonomi, Ashm., 210β
182. ,, incertus, Ashm., 210β
183. ,, tylodermae, Ashm., 215α
184. ,, coeliodis, Ashm., 219α
185. Heterarthrellus australiensis, How., 16ι
186. Arthrolytus puncticollis, Möll., 49
187. Psilocera rufipes, Ashm., 126α
188. Pteromalus macronychivorus, Pérez., 24β
189. ,, affinis, Walk., 111α
190. ,, calandrae, How., 230β
191. ,, communis, Nees, 139
192. ,, Daimenes, Walk., 193
193. ,, deplanatus, Nees, 224β
194. ,, Doumeti, Fairm., 121γ
195. ,, elongatus, Ratz., 200β
196. ,, gonatas, Walk., 47α
197. ,, eulophoides, Walk., 248α
198. ,, fulgidus, Först., 224γ
199. ,, latipes, Rond., 118
200. ,, ooctonus, Kawall, 136β
201. Pteromalus oryzae, Cam., 230γ
202. ,, oryzinus, Rond. 230β
203. ,, Pione, Walk., 161
204. ,, Pirus, Walk., 248α
205. ,, perilampoides, Walk., 184α
206. ,, tenuis, Walk., 121ε, 166
207. ,, semiotoides, Walk., 248α
208. ,, seniculus, Nees, 205
209. ,, transiens, Rond., 208α
210. ,, varius, Walk., 111α
211. ,, viridulus, Walk., 173δ
212. ,, sp., 7
213. Megapelte cretacea, Walk., 200α
214. Cirrospilus vittatus, Walk., 200α
215. Asecodes chabrias, Walk., 212α
216. Elachistus dimidiatus, Walk., 141α
217. Sympiesis uroplatae, How., 139δ
218. Cratoctrechus larvarum, Linn., 173ζ
219. Eulophus Alaparus, Walk., 173η
220. ,, cervicornis, Först., 34β
221. ,, femoralis, Zehnt., 139ε
222. ,, Coecilius, Walk., 119
223. ,, Hegemon, Walk., 224β, 224δ
224. ,, gummiferae, Fairm., 121γ
225. ,, gallarum, Fonsc., 129
226. ,, ramicornis, Fab., 180
227. ,, ulicis, Perris, 173β
228. ,, viridarius, Goureau, 224γ
229. Tetracampe galerucae, Fonsc., 141γ
230. Spartiophila bruchicida, Rond., 118
231. ,, orchesticida, Rond., 193
232. Entedon basalis, Rond., 121β
233. ,, caelestis, Goureau, 34β

234. Entedon confectus, Walk., 83α
235. ,, Busiris, Walk., 173β
236. ,, divitiacus, Goureau, 193
237. ,, distinctus, Goureau, 195
238. ,, cioni, Thoms., 213
239. ,, variolosus, Goureau, 213
240. ,, spartii, Ratz., 118
241. ,, cionobius, Thoms., 213
242. ,, Pentheus, Walk., 119
243. ,, Pharnus, Walk., 173γ, 227α
244. ,, Zanara, Walk., 151α
245. Pleurotropis phyllotretae, Riley, 138α
246. Secodes phloeotribi, Ashm., 253α
247. Holcopelte producta, Ashm., 121α
248. Astichus arithmeticus, Först., 68
249. Tetrastichus thanasimi, Ashm., 40α
250. ,, Deipyrus, Walk., 248β
251. ,, Hippia, Walk., 224β
252. ,, chlamytis, Ashm., 126α
253. ,, Orsidice, Walk., 141
254. ,, microrhopalae, Ashm., 139α
255. ,, scolyti, Ashm., 243
256. ,, spartii, Först., 173α
257. Trichogramma odonotae, How., 139β
258. Chaetostricha signata, Ratz., 156
259. Oomyzus gallerucae, Rond., 136α

PROCTOTRYPIDAE.

260. Proctotrypidae, 12α, 21β
261. Xenotoma rufopetiolata, Nees, 173δ
262. Proctotrypes spp, 36, 36α
263. ,, ater, Nees, 11
264. ,, calcar, Hal., 11
265. ,, obsoletus, Say, 19α
266. ,, pallidipes, Jur., 11
267. Platygaster Chrysippus, Walk., 173δ
268. ,, caudatus, Goureau, MS., 139
269. Trichacis rufipes, Ashm., 228δ
270. Fidiobia flavipes, Ashm., 121θ
271. Prosacantha caraborum, Riley, 4α
272. Aradophagus fasciatus, Ashm., 260α, β, γ
273. Gonatopus ptinorum, Licht., 43β
274. Anoxys Chittendeni, Ashm., 67β, 68β
275. Laelius bipartitus, Kief., 97
276. ,, Perrisi, Kief., 47α, 63
277. ,, tribialis, Kief., 63
278. ,, trogodermatis, Ashm., 24α
279. Cephalonomia formicaeformis, Westw., 62, 63, 68, 68α
280. ,, hyalinipennis, Ashm., 255β
281. ,, mycetophila, Kief., 272
282. ,, Xambeui, Giard., 43α
283. Apenesia coronata, Ashm., 22β
284. ,, parasitica, Smith, 230α
285. Ateleopterus tarsalis, Ashm., 22α
286. Scleroderma domesticum, Latr., 54α, 73, 74α
287. ,, Fonscolombei, Westw., 248α
288. ,, fuscicornis, Westw., 248α

XX. *On the Persistence of Bacilli in the Gut of an Insect during Metamorphosis.* By A. Bacot, F.E.S.

[Read March 1st, 1911.]

In the course of some research work I am conducting, the possibility of a Bacillary infection of the larval gut of an insect persisting through the period of metamorphosis and continuing in the adult after emergence from the pupae is of considerable importance. I therefore infected the food of some newly hatched larvae of *Musca domestica* with a culture of *Bacillus pyocyaneus*. Puparia from this brood were sterilised outwardly by placing them in 5 per cent. to 10 per cent. solutions of lysol for five or ten minutes, then washing them in sterilised distilled water and transferring to tubes of sterile broth. They were allowed to remain in the tubes of broth for varying periods, and were then removed to a second tube of sterile broth and torn open with sterile needles. The first tube formed the control, the second the culture tube. Other puparia were passed five or six times through the flame of a Bunsen burner, and then treated in the same manner as the first batch. Growths of *pyocyaneus* were obtained in all the culture tubes and in some instances from the controls as well; these latter being cases in which the puparia had been allowed to remain in the control tubes for periods of eight or twelve hours. Adult flies that had been reared from infected puparia which had been sterilised as before mentioned, were again sterilised after their emergence, and when experimented with also gave positive results A specimen that emerged from its puparia whilst under observation was used after sterilisation with the same result, only that it gave much quicker and stronger growth, presumably because it had not been able to void the contents of the gut, which is the usual habit shortly after emergence.

These results, which have since been confirmed by Dr. Ledingham of the Lister Institute, seem to prove

conclusively that certain species of Bacilli ingested during the larval period of *M. domestica* can retain their existence whilst their host is undergoing the process of metamorphosis and continue their existence in the gut of the adult fly after emergence.

M. domestica, therefore, from its first emergence from its puparia, may be an agent in the spread of infecting organisms. It is probable that *M. domestica* is not an isolated species in this respect. The process of histolysis as described by Lowndes in regard to the Blow-fly suggests that there is no necessary bar to the continued existence of bacilli in the insect's gut from the larval to adult stages, and I have already some evidence that this may prove to be the case with insects of another order. The full details of the experiments are being published in the *Journal of Hygiene*.

There remains, however, a point, possibly of more interest to entomological than to medical science, as to the source of the infection of certain of the control tubes, after the inwardly infected but presumably outwardly sterile puparia had been allowed to soak for lengthy periods. From five to twenty-five minutes was not sufficient to cause infection, but periods of several hours or the passage through several different media seemed certain to produce infection. My own view is that this may be due to the slow passage of fluid through the stigmata of the puparia owing to an inward suction. It is noticeable that the growth arising from soakage as contrasted with pierced or cracked puparia is slow and feeble. Where puparia were passed through the Bunsen flame the growth in control was in comparison strong and rapid; this may have been due to a quicker and stronger suction through the stigmata owing to the cooling of the heated puparia in liquid or possibly to rupturing due to heat. There is another possible way by which infection might come about. When the larva shrinks into a blunt-ended oval at the close of its active existence, the mouth parts are retracted into a small pocket on the outward surface of the case; it seems possible that the sterilising fluids do not penetrate freely into this intricate passage, with the result that some organisms survive, and come in contact with the broth of the control tube if allowed to soak for any length of time. In order to prevent any possibility of infection by way of the stigmata, a further series of experiments were carried out

in which the ends of the puparia were varnished or waxed. The larvae from which the puparia were reared were again supplied with food infected with *B. pyocyaneus*, but the possibility of infection by other species of Bacteria by way of their food was not specially guarded against.

The ends of a number of puparia were varnished, and a few had the ends dipped in hot beeswax, the object being to seal the stigmata and any possible opening that might exist by way of the scar of the larval anus.

These puparia were then soaked in 10 per cent. solution of lysol or formaline for periods of from 9 to 39 hours, in most cases 10 or 12 hours. In some instances they were washed before the transference to tubes of broths, in others the washing was omitted. Events prove that washing was devoid of significance so far as the result is concerned.

After allowing the puparia to remain in the tubes of broth that formed the controls for periods of from $2\frac{1}{2}$ to $19\frac{1}{2}$ hours they were pierced or cracked in the culture tubes. In two instances second controls were used. These had respectively 14 hours first control, 12 hours second ; and 3 hours first control, $8\frac{1}{2}$ hours second.

In all, ten experiments were made : nine with varnished, and one with waxed puparia.

Every culture tube produced a growth, even after so long a sterilisation as 39 hours in 10 per cent. formaline.

Nine cases in which broth was used show clear evidence of *B. pyocyaneus* being present. One experiment in which an agar slop was used in place of the broth is not definite.

Of the controls, seven tubes were sterile, and five were infected. This number includes the two second controls, and that of the experiment where the puparia were allowed to remain in the control tube for $19\frac{1}{2}$ hours.

One tube alone, however, shows *B. pyocyaneus* in a control. In the other four instances the growth is apparently that of a strictly aerobic organism, as the broth, after the formation of a scum, became clear and gave sterile slides under the microscope. It would seem, therefore, that varnishing or waxing, if efficiently carried out, prevents the broth being infected from the interior by way of the stigmata ; and supports the contention that the infection of controls in various experiments was due to soakage through the air passages of the puparia.

The infection of the controls in these latter experiments is, I suggest, due to organisms that either resist the sterilising agent, or are protected from it for a period by the varnish or wax, and are then released by a shrinkage or partial peeling of the varnish, or wax, covering.

October 21, 1911.

XXI. *On the British (and a few Continental) species of* Scoparia, Hw. By T. A. Chapman, M.D., F.Z.S.

[Read March 15, 1911.]

Plates XXXV—XLIV.

The suggestion to examine the British Scoparias came from Mr. E. R. Bankes. Though the opinions as to what are and are not distinct forms held by Mr. Bankes are, I believe, those accepted by the few other English entomologists that know the genus, and are practically identical with those I arrive at, they differ from those of any of the systematic works I have examined. The necessity for some such investigation as that here presented is therefore obvious.

Barrett ("Lepidoptera of the British Islands," 1904) differs from Meyrick (Handbook, 1895), who appears to be simply copied by Hampson (Trans. Ent. Soc., 1897). Staudinger (Cat., 1901) differs from all these, and seems to be simply copied by Spuler (Hofmann's "Schmetterlinge," 1910); nor do any of these agree with what appear to be the true facts. Barrett makes one species too many. Meyrick is certainly most in error as, with the greater pretensions to a scientific position, he lumps three species together, and has apparently led astray Hampson, Staudinger, and Spuler.

The different views held by all these authorities have reference almost entirely to the group indicated by the four names *basistrigalis*, *ambigualis*, *atomalis*, and *ulmella*.

In examining the male appendages to throw light on this matter, it was obvious that to examine these species alone was by no means sufficient; an examination must also be made of a number of other species so as to obtain some idea of what were specific characters of value. I therefore determined to examine all the British species and as many European species as could be readily obtained.

I do not think the Continental magazines show anything of importance on the question of the value of the specific distinctions claimed to exist between these four forms;

at any rate, I have not met with any. This is not, of course, surprising, considering that *ulmella* is not recorded out of England, and *basistrigalis* is nearly, if not really absolutely, in the same case. Our English magazines, on the other hand, have quite voluminous papers on the subject, to which I suppose I must make some reference, though it would be quite out of the question to transcribe them in full.

Knaggs certainly deserves the first place in connection with these species, having first described *basistrigalis* and *ulmella* (in E. M. M., iii, 1866, pp. 1 and 217). In 1869 he gave a *résumé* of the genus in the E. M. M., vol. v, p. 291. In this paper he makes nineteen species, of which five have since by general consent been sunk as varieties or local races of others: these are *zelleri*, *ingratella*, *phaeoleuca*, *gracilalis*, and *atomalis*. Two of these, *ingratella* and *phaeoleuca* are "good" species found on the Continent, but the supposed British representatives have been dropped as being varieties of other British species.

Hodgkinson has communications, amongst others E. M. M., vi (1869), p. 41; "Entomologist," xiv (1881), p. 223; E. M. M., xviii (1882), p. 134. He describes a new species, *conspicualis*, shown by Mason, E. M. M., xxiii (1877), p. 163, to be synonymous with *ulmella*.

A paper by Bower, E. M. M., xxxi (1895), p. 273, firmly establishes *basistrigalis* as a "good" species, as no one (Hampson excepted) seems to have disputed its position since.

Bankes, E. M. M., xxvi (1890), p. 7, clearly shows that *atomalis* and *ambigualis* are but one species, and mentions seeing drawings of the *genitalia* from Dr. Mason, but of these I find no other record. There are other communications by Briggs, Porritt, and Tutt.* In 1900 Knaggs has in the "Entomologist" (xxxiii, p. 109) an able paper on this group (*ambigualis*, *etc.*). He produces many reasons for retaining *atomalis* as distinct from *ambigualis*. In Staudinger's list, published just after, *basistrigalis* is admitted, but *atomalis* and *ulmella* are sunk under *ambigualis*; possibly the *ulmella* was disallowed under a doubt raised by Dr. Knaggs's plea for *atomalis* being unsound,

* Other references are: Briggs, "Entomologist," vol. xxii (1890), p. 17; E. M. M., vol. xxvi (1890), pp. 50, 124; Tutt, E. M. M., xxiv (1887), p. 43; E. M. M., xxvi (1890), p. 51; Porritt, E. M. M., xxvi (1890), p. 88.

weakening the little he said about *ulmella*. Barrett, later (1904), followed Knaggs, and Spuler (1910) followed Staudinger.

An examination of the genitalia confirms the conclusion arrived at by Bankes, Bower, etc., and shows the high authorities above quoted to be in error.

The British Scoparias appear to divide themselves into two groups. Bionomically these are (1) those whose larvae are more or less known to feed on mosses and lichens; (2) those whose larvae are for the most part unknown, but probably, from the analogy of *S. cembrae*, the only one of the group certainly known, feed on the root stocks of flowering plants, and most likely of compositae. These two groups may also be defined by the male appendages, the latter group possess very large and obvious darts (cornuti) on the eversible membrane (*vesica*, Pierce) of the *aedoeagus*, the former (the moss-feeders) are quite without them. That they possess other obvious characters to distinguish them is proved by the fact that nearly all accounts of the genus place the root-feeders (if so) together, at the beginning, with the moss-feeders following, or *vice-versâ*.

The British species that belong to the root-feeders are—
cembrae.
basistrigalis.
ambigualis (*atomalis*).
ulmella.
dubitalis (*ingratella*).
The remaining nine are the moss-feeders.

The root-feeders may be defined—

1st. As root-feeders. This is a definition founded not on knowledge, but on ignorance, and so may seem open to objection and even ridicule. It takes, however, a positive and unobjectionable form, if we say, had they been moss-feeders we should have ascertained it, therefore they must feed on something else; that that something else is roots is, of course, a guess founded on our knowledge of one (or possibly two) species only.

2nd. There is a decided difference in wing form. The ends of the fore-wings are more square in the root-feeders, more oblique, *i. e.* with more pointed apex in the moss-feeders. There is a little corresponding difference in neuration. In the moss-feeders the portion of cell margin between veins 3 and 4 of the fore-wing is shorter, and

takes a bend at vein 3, in excess of what it does in the moss-feeders. In this respect *pallida* agrees with the moss-feeders, but it disagrees in a character to which Knaggs called attention in 1869 (E. M. M., p. 291), viz. the relation of the orbicular and claviform stigmata to the first line. In the root-feeders these stigmata touch the line; in the moss-feeders, one or both are free from it. By this character *pallida* should be a root-feeder.

A. *Scoparia dubitalis.*
B. *Eudoria sudetica.*

Camera sketch of neuration of fore-wing, characteristic of "root-feeders" (*Scoparia*) and "moss-feeders" (*Eudoria*). Note relative lengths of *a* and *b* in the two species.

3rd. The male appendages in the root-feeders have conspicuous darts (cornuti) in the aedoeagus; the clasps have at their ventral basal aspect a thickened portion, ending at half the length of the clasp in a free spine (Harpe), and the uncus is tapering, sharp, and simple.

In the moss-feeders there are no cornuti, no spine on the margin of the clasp, and the end of the uncus is blunt, almost double, due to the arch underneath coming close to the tip, instead of arching across some way from the end.

By this 3rd character *pallida* is a moss-feeder. It is the only British species that is not by these 2nd and 3rd set of characters distinctly of one group or the other.

There is a difference in the ♀ genitalia in at least one point between *Scoparia* (root-feeders) and *Eudoria* (moss-feeders. In *Eudoria* there is a small area quite entitled to be called the *lamina dentata*, as here the angular chitinous points are packed closely together and are well developed, being over the rest of the sac hardly present. In *Scoparia* they are very little more developed at one point than another, but more developed than they are in the unspecialised area in *Eudoria*. Still, there are several species that do not show this difference in at all a marked manner.

I present photographs of the terminal segments of the females of most of the species dealt with, and also of the Bursae.

I cannot define the genera on characters from these structures, perhaps because I have not studied them enough. There is a tendency, however, in the moss-feeders to agree in having a somewhat spherical bursa, with a patch of spicules, and to have a structureless spherical cavity beyond the bursa. In the root-feeders the tendency is to have this tract less markedly divided into spherical cavities; the bursa is a widened portion of the tube, with spicules well distributed, but more developed on either side, and there may be a not dissimilarly armed area nearer the lower end of the tube, whilst the upper unarmed termination is not separated from the bursa by a very marked constriction. But individual species are sufficiently exceptional to prevent any definite rule appearing. It is also certainly the case that the last segments, by their form and the length of the rods, show much greater extensibility in the moss-feeders than in the root-feeders, implying that the former place their eggs more deeply than the latter do.

There is another character that is very variable between the different species in the relations of veins 7 and 8 of the hind-wings. The anastomosis of these obtains in so many genera of Pyrales, that one hardly expects it to be so very variable in amount in one genus. In *basistrigalis* they do not really anastomose, but only touch for about 0·3 mm. In *alpina* they are coincident for about 1 mm., but I do not find that this difference obtains in a way to distinguish the moss-feeders from the root-feeders, since it

is, for example, a short anastomosis in *sudetica* and long in *ingratella*.

There are, however, two species that do not quite fall in with these simple divisions. These are *crataegella* and *pallida*, and of European species, *centuriella* and *pyrenaealis* equally occupy distinct and isolated positions.

Of the various authorities I have so far referred to, beyond placing the root-feeders and moss-feeders more or less together, none give any indications of the natural affinities of the species and consequent divisions of the genus.

To find anything of this sort we have to go back to Guenée (1854). With the exception of *pyrenaealis* and *crataegella*, he distinguishes each of the divisions that I find in fact to exist, and even *pyrenaealis*, though not separated, is placed at the top of its division as not quite according with the others. *Crataegella* thus forms the only new section that I recognise, and I certainly was somewhat surprised to find the genitalia gave it so definite a position, as I fully sympathised with those entomologists who found it difficult to separate it from *frequentella* (*mercurella*), although the distinguishing markings though small, are very definite.

Stephens (Illust. Haust. iv) and Zeller (Linn. Ent., i, p. 262) afford no assistance in showing the mutual relationship of the species.

Ochrealis ought to be referred to, it is really not a Scoparia. Neither the clasp, the uncus or the tenth sternite are at all like those of any other species, and the cornuti contained in the aedoeagus are 50 or 60 in number, short acute spines, ranged 3 or 4 wide along the whole length, not altogether unlike, say, *Acronycta tridens*, but with no resemblance whatever to any Scoparia.

Guenée gave this a separate genus, *Cholius*, in which he was quite right, but probably, as he says, wrong in placing it in *Crambina*, but also wrong in replacing it in *Scoparia*. The real place seems to be somewhere in *Pyraustinae*. It may or may not be the nearest pyraustid to *Scoparia*, but it is not very near.

Putting *ochrealis* aside, all the other species I have examined are certainly tolerably closely related, but admit of being easily divided into groups, which may be called genera or subgenera.

The divisions are practically those instituted by Guenée. He did not give them names, and this may account for

later, but obviously less scientific authorities neglecting them. To such distinctions as appealed to Guenée, I add the definite structural points afforded by the genitalia, and supply them with names which will be useful in any future discussions of the group.

I classify as follows—

PYRAUSTINAE?

CHOLIUS, Gn. (Ind. Micr. p. 95) Group IV, Guenée.
ochrealis, Schiff.

SCOPARIINAE.

1. SCOPARONA (Augm^te^ of Scoparia). Guenée, Group I.
centuriella, Schiff.
2. SCOPARIA, Hw. Guenée, Group II. † and ††.
Dubitalis, Hb.
(*ingratella*, Z.)
ambigualis, Tr.
(*atomalis*, Dbld.)
gallica, Peyer.
manifestella, Hs.
ulmella, Kg.
cembrae, Hw.
basistrigalis, Kg.
phaeoleuca, Z.
perplexella, Z.
3. ANARPIA (α ἁρπη). Included by Guenée in Group II †.
pyrenaealis, Dup.
4. WITLESIA (Whittlesea syncopated). Group III, Guenée.
pallida, Stph.
5. DIPLEURINA (δὶs πλευρα). Included in Guenée's Group II †††.
crataegella, Hb.
6. EUDORIA (mutation of *Eudorea*). Group II †††, Guenée.
murana, Curt. (type).
truncicolella, Stt.
suletica, Z.
(*petrophila*, Stndf.).
frequentella, Stt. (*mercurella*).
alpina, Stt.
valesialis, Dup.
angustea, Stph.
lineola, Curt.
resinea, Hw.
laetella, Z.

2 are the typical "root-feeders," 6 the moss-feeders.

It may be convenient before treating the species in order, to consider first those as to which I have anything definite to say as to specific separation or otherwise of forms, as a result of studying the appendages.

In 1867 Knaggs introduced *ingratella* as a British species (E. M. M., iv, p. 61, 1867), but this was afterwards abandoned on the ground that Knaggs's specimens were only varieties of *dubitalis*.

When we examine the appendages we find those of *dubitalis* and *ingratella* quite identical, except as to size, *dubitalis* being the smaller. The cornuti are placed in a row, are five or six in number, the most forward (whilst still within aedoeagus) the larger, the rest dwindling regularly. When we get a side view of them this is very obvious, but if they happen to be superposed, it is at first difficult to see that they are not one long rod, until the several bases are discerned, the tips being in this position quite obscured.

If there is no difference here what is the difference otherwise? It is an almost inappreciable one of size. *Dubitalis* has an expanse of 18 mm. up to 22 mm.; *ingratella* 20 mm. to 23 mm. My specimens of the latter are some sent by Zeller to Barrett, some received from Staudinger are identical, so that I believe I have the true *ingratella*. *Dubitalis* var. *ingratella* from Mr. Bankes is very like those I have as *ingratella*. The chief differences I can see consist in the claviform stigma being more usually open in *dubitalis*, closed, *i. e.* without a distinct pale centre, in *ingratella*.

Dubitalis has a paler whiter colour, and the markings are more distinct; *ingratella* is of a warmer yellower tint, and the markings are pale; it exaggerates, but marks the difference, to say that *dubitalis* has some of the markings black, in *ingratella* they are merely an accentuation of the ground colour. But specimens that are taken with *dubitalis*, and are, I presume, undoubtedly *dubitalis*, including English *ingratella*, vary in the same directions and are in fact indistinguishable from *ingratella*. I conclude that *ingratella* is a larger, paler as regards markings, richer as regards ground colour, form of *dubitalis*, a southern form, if not absolutely geographically, at least as regards summer temperature.

Ambigualis and *atomalis* might be dealt with as being closely parallel to *dubitalis* and *ingratella*. They need

also less discussion as the consensus of opinion is now that they are one species, a consensus that in the case of *dubitalis* only refers to English *ingratella*, the result probably of English acumen applied to this point, and not to whether English and Continental *ingratella* were identical.

The appendages of *ambigualis* and *atomalis* are identical except again that those of *ambigualis* are altogether larger, quite distinctly so in typical instances, viz. as 12 to 11. In *ambigualis* we have a southern larger and paler, in *atomalis* a northern smaller and darker form. I should say that the extreme forms were much more nearly distinct species, than were any forms of *dubitalis* and *ingratella*.

Two other forms, *manifestella* and *ulmella*, have appendages that I cannot distinguish except in size. Though I have no hesitation in saying that in a certain broad sense these two forms are one species, they are nevertheless vastly more distinct from each other than is *ingratella* from *dubitalis* or *atomalis* from *ambigualis*. Their habitats are widely separated. I know of no intermediate forms. The difference in size is very great, 26 mm. and 17 mm., and there is one really important difference in marking, viz. the orbicular stigma is usually separate from the first line in *manifestilla*, never I think in *ulmella*.

They are, again, a northern and southern form whose differences have been exaggerated by long segregation, so that for all practical purposes they must be treated as distinct species.

The male appendages of these two forms appear to be quite identical except in one point: those of *manifestella* are about 10 per cent. larger than those of *ulmella*. There is a very similar difference in size in the moths so far as my examples show, though I believe some of my *manifestella* are rather large specimens. Are we to regard these two forms as one species or as two? I think the usual custom in such cases is to regard them as one species. They are, no doubt, very marked geographical races, that have not been syngamics for a long period, but, on the other hand, they can have separated really only yesterday, so to speak, in comparison with the period, whatever it may be, necessary to differentiate unquestionable species.

Though the question may thus be raised as to whether *ulmella* should not be regarded as a race of *manifestella*, its differences from *ambigualis* are very great, though

various authorities who ought to have known better have confounded them.

Basistrigalis is very distinct from any other species.

There are two other forms that seem to be very probably really only forms of one species. These are *sudetica* and *petrophila*. *Petrophila* is the smaller and darker, yet it can hardly be called either a more northern or more alpine form. I take it, however, to be a local race of the more wide-spread *sudetica*, the appendages are identical.

I add a few notes on the appendages of each species that will make the photographs of them more easily understood as to the points of specific distinction they possess.

I have to regret that I have not mastered any satisfactory way of spreading these appendages for observation. They are rather awkward and obstinate, and at the same time small and delicate, so that one has to accept a poor result rather than persevere at the risk of considerable damage to the specimen.

Centuriella (figs. 2–5) has large dense appendages. The aedoeagus is rather narrow, there are no cornuti, the uncus is not tapering as in the other species, but has nearly parallel sides narrowing only a little to a broad blunt tip. The tenth sternite * also thicker before the apex, and on its upper surface has some minute rough teeth; the large clasps have some not very definite basal thickening, they also have a spine about the middle of the ventral margin, but this springs from quite a soft margin of the clasp, it is short and blunt, and is free from hairs only in a short terminal portion.

The question as to whether *ambigualis* and *atomalis* (figs. 8, 10, 11, 12, 13) are distinct species seems to be fairly settled in the negative without reference to the appendages. So far as structure goes these also appear to be quite identical. I found one or two typical specimens of each form differed quite decidedly in size, but before undertaking to consider how far this suggested distinct species, local races, or what not, I thought it best to measure some specimens without reference as to which species they might belong, this partly because I could

* I propose to point out elsewhere that this is usually called the *scaphium*; it is, however, subanal, but is not the sub-scaphium of Pierce. The scaphium of Gosse is supra-anal. Pierce is the only authority who seems to have understood this.

not always decide which the specimen before me really was. I measured from the base of the clasp to the end of its lateral spine, and also the total length of the clasp.

The result comes out that in ten specimens measured, the length from the base to the end of the spine shows 0·87, 0·90, 0·93, 0·93, 0·93, 0·96, 0·96, 0·96, 0·99, 1·05 mm. The total lengths are 1·23, 1·24, 1·26, 1·29, 1·30, 1·35, 1·35, 1·37, 1·41, 1·47 mm. These figures show that, though the smallest are *atomalis* and the larger *ambigualis*, there is no point at which a line can be drawn to separate them as of different sizes, since as a matter of fact the two series overlap.

Cembrae (figs. 24–27) may be taken as a type of the root-feeders. The clasps have the basi-ventral thicker portion large, and the hook or spine in which it ends is two-thirds the length of the side of the clasp from the base. It is strong and curved well away from the clasp, so that its point is in a line nearly transverse to the length of the clasp.

The dorsal armature consists of an uncus, which may be perhaps more easily described by likening it to the toe, or rather the front three-quarters of a slipper, but with sole and upper in one continuous piece. The sole is on the dorsal aspect, the sides are narrow, the apex is prolonged to a point, and the two sides meet about two-fifths of the total length from the point, the surface has various long hairs. In the base of the uncus is hinged a piece that must be called the tenth sternite. When closed against the uncus it is of about the same length. It is a straight piece tapering to a curved point, and basally divides into two branches widely separated, and it is by the ends of these that it is hinged to the base of the uncus. The arch formed by these two branches below and the cavity of the "slipper" above give space to the anus.

The aedoeagus is broad and short, 1 mm. long, or perhaps less, as a terminal ring seems to be possibly everted membrane, and nearly 0·3 mm. wide. It contains two groups of cornuti. In one of these the separate spines are so much soldered together that the mass might almost be regarded as one spine. In the other they are closely connected, but are partially separate, the largest one about 0·4 mm. long.

It is to be noted that the uncus is soft membrane carrying hairs, and is easily deformed in preparation and

mounting, the tenth sternite is of hard smooth chitin without hairs, and a very strong definite mark or fracture is seen if it be damaged.

In *basistrigalis* (figs. 19–23) the uncus and tenth sternite are very like those of *cembrae*. The basal arch of the tenth sternite is narrower, and the branches enclosing it therefore shorter, but the long spike of which it mainly consists is rather longer (total length about 0·6 mm.).

The thickened upper margin of the clasp is more marked, and extends nearer to the end of the clasp. The lower marginal thickening is, however, much smaller, and its terminal spine lies almost parallel to the margin of the clasp. The result is that the smooth, soft portion of the clasp looks larger.

The aedoeagus is fractionally longer and narrower than in *cembrae*. The cornuti as seen within it are in two rows, those in each row partially united at their bases, the longer spines nearer the opening (a little over 0·25 mm. long), and those of one group stronger but fewer than in the other.

In *ambigualis* (figs. 8, 10, 11, 12, 13) (*atomalis* is identical) the uncus is narrower and shorter, as also the tenth sternite (about 0·4 mm. long). The bridge is narrower and the two branches are less spreading, the margin of the long spine continuing down to the hinge in one smooth sweep, without any bend as in *cembrae* and *basistrigalis*. The thickened dorsal margin of the clasp is very definitely outlined. The basi-ventral thickening is intermediate between those two species, and the terminal spine is at an angle of about 45° to the margin of the clasp. Aedoeagus is a full millimetre long and about ·25 wide. The cornuti are in a group of two rather long (0·25 mm.) and strong, a third smaller, and three or four others diminishing so that the smallest is hardly visible.

In *manifestella* (and *ulmella*) (figs. 14–18, 72) the cornuti of unknown number are fused together into one solid and rather thick mass, not unlike in form and appearance to the horn of a rhinoceros. The aedoeagus is short and broad, a characteristic of "root-feeders." The spines of the clasps are strong and sharp, and leave the clasp at about the middle of the lower margin.

In *gallica* (figs. 39, 73, 74) the spines on the clasps are rather sharply hooked at the tips, and as compared with nearly all the other species they are thick and straight, with

the hook quite at the tips, instead of having a regular curve and a gradual taper throughout. The cornuti are five or six in number, not very unlike those of *dubitalis* but larger and stronger. The resemblance to *dubitalis* is considerable, but the size is to that of *dubitalis* as 4 to 3, and the general appearance and texture is of at least corresponding density and robustness.

Phaeoleuca (figs. 28–30) much resembles *ingratella* (figs. 7 and 40) in having the cornuti very long, straight and slender, two long ones and one or two shorter often apparently only two, but the shorter are so closely adpressed to the longer that one suspects their existence as they cannot easily be made out. In *ingratella* these cornuti are much shorter and less robust than in *phaeoleuca*, being about 0·55 mm. long, whilst in *phaeoleuca* they are about 0·8 mm. and much denser and stronger.

Some specimens from Staudinger, sent as *ambigualis*, var. *syriaca*, are indistinguishable from *phaeoleuca* (assuming that I have the latter species correctly named)—at first I took them for *ingratella*. In any case they are certainly not *ambigualis* in any form.

In *perplexella* (figs. 31–32, 69, 71) the appendages are very large, equal in size to those of *centuriella*. The species is itself a large one. Unlike *centuriella* it is a typical *Scoparia*, nearer, perhaps, to *dubitalis* than to any of the others.

Pyrenaealis (figs. 33–35) (with *crataegella*, though quite differently) has some characters making it intermediate between the root- and moss-feeders. It belongs rather to the root-feeders as having well-developed cornuti. These are long and slender, like those of *phaeoleuca* or *manifestella*, but differ in being not straight but curved. The clasps, however, are those of the moss-feeder group in having no side spine or corresponding thickened basal portion.

The specimen of *incertalis* I have is *pyrenaealis*.

Crataegella (figs. 41–43) is a moss-feeder in fact, and as regards the appendages also, in possessing no cornuti. The aedoeagus is rather curved, and less slender than in most moss-feeders. It has a root-feeder character in a modified form, viz. the clasps have the basi-ventral thickening, but this is narrower than in the connected species, and stretching further along the margin of the clasp, ends, not in a spine, but in a rounded thickening that is only just free at its end from the body of the clasp. In mounting this clasp it was found to differ from both

the sections in having a dense margin above and below, and always tending to fold in the intermediate softer portion, so as to be very troublesome to spread, in a way different from either of the other sets.

This very distinctive structure of the appendages shows that it is wholly unrelated to *frequentella* (*mercurella*).

In the moss-feeders there is difficulty in finding any striking characters to distinguish the several species, such as are afforded by the cornuti of the root-feeders. There are, before going into specific detail, to be noted two structures (or parts of one) that are present in all these, but one of which is apparently wanting in the root-feeders, or if present is in a rudimentary and inconspicuous condition. These would appear to be details of the penis-sheath, *i. e.* of the floor of the cavity in the region where the aedoeagus pierces it. One is a thin flat plate of chitin, of somewhat pear-shaped outline, the rounded end attached between the bases of the clasps and the narrow end close to the aedoeagus and with the rest of the floor attached to it, and is dragged when the aedoeagus is forcibly displaced. (This can be seen in the root-feeders.) The other consists of two small rounded eminences, one in either side, carrying a few hairs.

As a rule, both insects and appendages are smaller than in *Scoparia*.

Pallida (figs. 36–38, 67) has the tenth sternite broad and flat, hardly divided into an arch at base, and a long narrow body. The neck is half-way up, the body is comparatively broad, so that it is more nearly a flat triangle than the arch below and the rod-like body above, as in most species.

Alpina (fig. 57) may be distinguished from the other species under review by the character of the tenth sternite, which has spreading wings forming the arch, but the column is broad and thick, the end blunt and roughened by minute points; the division between the basal wings runs as a suture an unusual distance up the broad column. The dorsum of the ninth segment is conspicuous as a triangular well-chitinised piece.

Resinea (fig. 65), unlike *alpina*, has the wings of the tenth sternite forming a very low and flat arch, and the body, rising from them already narrow and as a thin pillar, tapers almost to a point. No other species has the pillar or body of the tenth sternite so slender and tapering.

There are further eight species (of which five are British)

of moss-feeders, whose appendages are very much alike. Of these *angustea* (figs. 59–60) is at once distinguishable by the shortness of the aedoeagus (about 0·78 mm.), about three-quarters that of any of the others, which, however, vary a little.

Frequentella (*mercurella*) (figs. 54–56) has a very definite bend in the aedoeagus much like *sudetica*.

Frequentella and *sudetica* (figs. 50–53) have the tenth sternite with a very low base and arch and a long, straight, rather slender shaft, with an almost bulbous tip in *frequentella* present but not so pronounced in *sudetica*. *Sudetica* has the opening of the "slipper" (of the uncus) extending nearly to the tip, in *frequentella* it arches over only about one-third from the base, *i. e.* high up in the instep.

Valesialis (fig. 58) is larger than any other of the moss-feeders, the clasps being 1·2 mm. long against less than 1·00 for any of the others. The chitin is denser and darker. The aedoeagus, however, is small by comparison, *i. e.* about the same length as the others (1·00 mm.) but narrow, viz. 0·13 mm. The uncus is very similar to that of *lineola*.

In *lactalis* (figs. 64, 66, 70) the blunt end of the uncus characteristic of the moss-feeders is broader and more distinctly notched in the middle than in any of the other species. The tenth sternite is about equally divided in length between the shaft and the basal arch, the shaft is of about uniform, rather narrow, width for its whole length, and the base spreads almost suddenly, with straight lateral margin from its lower end.

Lineola (figs. 61–63) differs from any other member of this division (except *lactalis*) in having the clasps much narrower than in them just beyond the dorsal margin of its attachment, agreeing in this very nearly with *lactalis* and *pallida*, e. g. in *lineola* the width at this point is 0·2 mm. and 0·33 at the widest point. In *truncicolella* the relative widths are 0·27 and 0·33, and in *laetalis* 0·20 and 0·27 mm. The aedoeagus has a slight S bend and is rather broad (0·17 mm.), broader than any other except *truncicolella*, a fact the more conspicuous as the appendages as a whole are rather small.

Murana (figs. 44–46) has a slightly shorter aedoeagus than the other species (except *angustea*) of this group (barely under 1·00 mm.). The uncus is at once distinguishable as having the opening of the "slipper" very square, so that the two sides are of about equal width up to the

top of the opening, like two pillars, instead of gradually widening from a pointed end, and the top is nearer a transverse straight line than an arch.

Truncicolella (figs. 47–49) differs from *frequentella* and the rest of this group in the width of the aedoeagus (0·20 mm.). It also differs from *frequentella* in the base of the tenth sternite sloping up to the shaft, and in the shaft itself being therefore proportionately shorter, and in that it is tapering instead of rod-like, being thicker at its base. The opening of the "slipper" is much as in *frequentella*, but in *truncicolella* one sees that these differences in the opening of the slipper are merely apparent; what differs is that the "upper" of the "slipper" is in *mercurella* of uniform texture, in *truncicolella* the medium strip from the opening to the tip is comparatively pale and structureless, and probably in *sudetica* is still present, but more membranous and invisible.

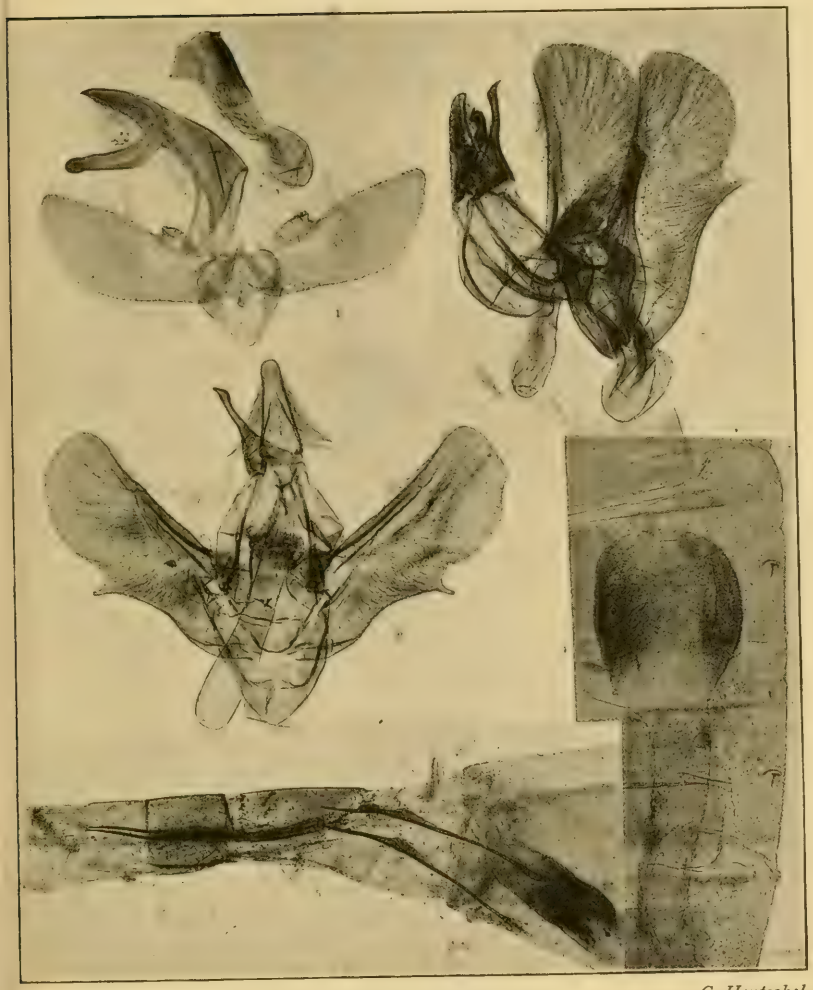
The appendages of *sudetica* and *petrophila* seem to be identical. There is a trifling difference in size. The length of clasp of four *petrophila* averages 1·1 mm., of ten *sudetica* 1·04. Except that *petrophila* is much darker in colour, I can see no difference in the general character of the imagines. I think, therefore, these two are local races of one species. *Sudetica* is a very variable insect both in size and depth of colour, and I imagine if the depth of colour in any locality exceeds a certain amount it is called *petrophila*.

Explanation of Plates.

All figures × 20 except figs. 23, 27, 30, 46, 67, 68, 69, 70, 72 and 74, which are × 40, and 71 × 30.

Plate XXXV. Fig. 1. *Cholius ochrealis*, ♂.
2. *Scoparona centuriella*, ♂ lateral view.
3. „ „ , ♂.
4. „ „ , ♀ bursa.
5. „ „ , ♀ last segments.

Plate XXXVI. Fig. 6. *Scoparia dubitalis*, ♂.
7. „ *ingratella*, ♂.
8. „ *ambigualis*, ♂.
9. „ *dubitalis*, ♀ last segments and bursa.
10. „ *ambigualis*, ♂ lateral view.
11. „ *atomalis*, ♂.

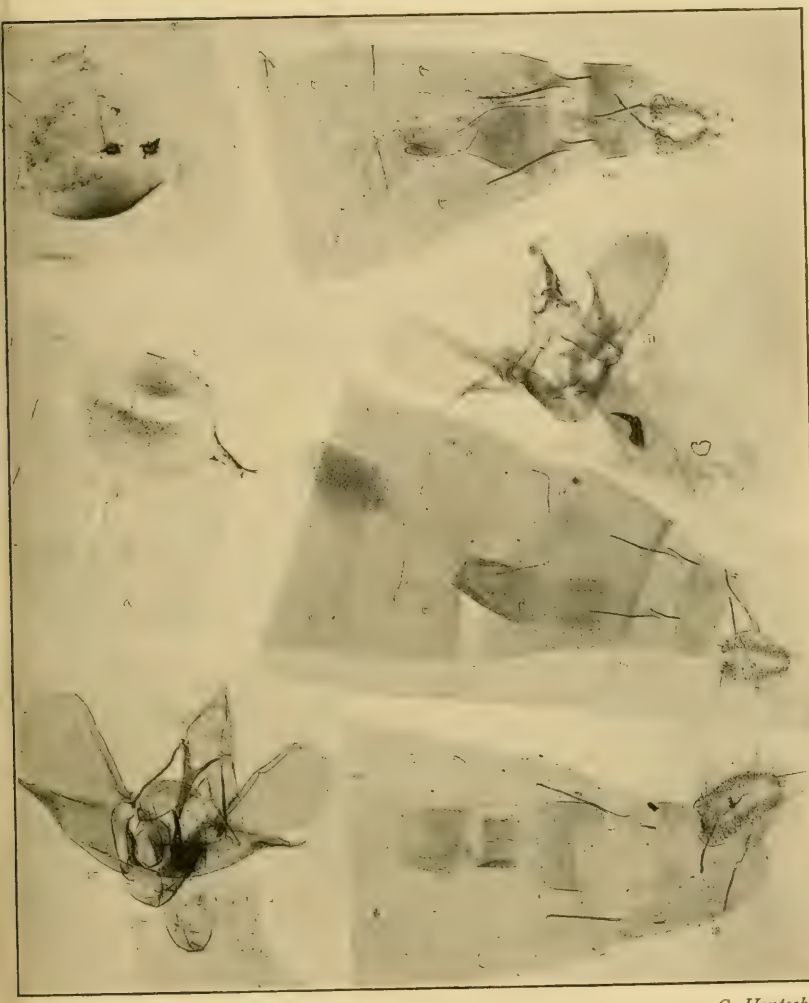


A. E. Tonge, photo. *C. Hentschel.*

CHOLIUS, SCOPARONA.

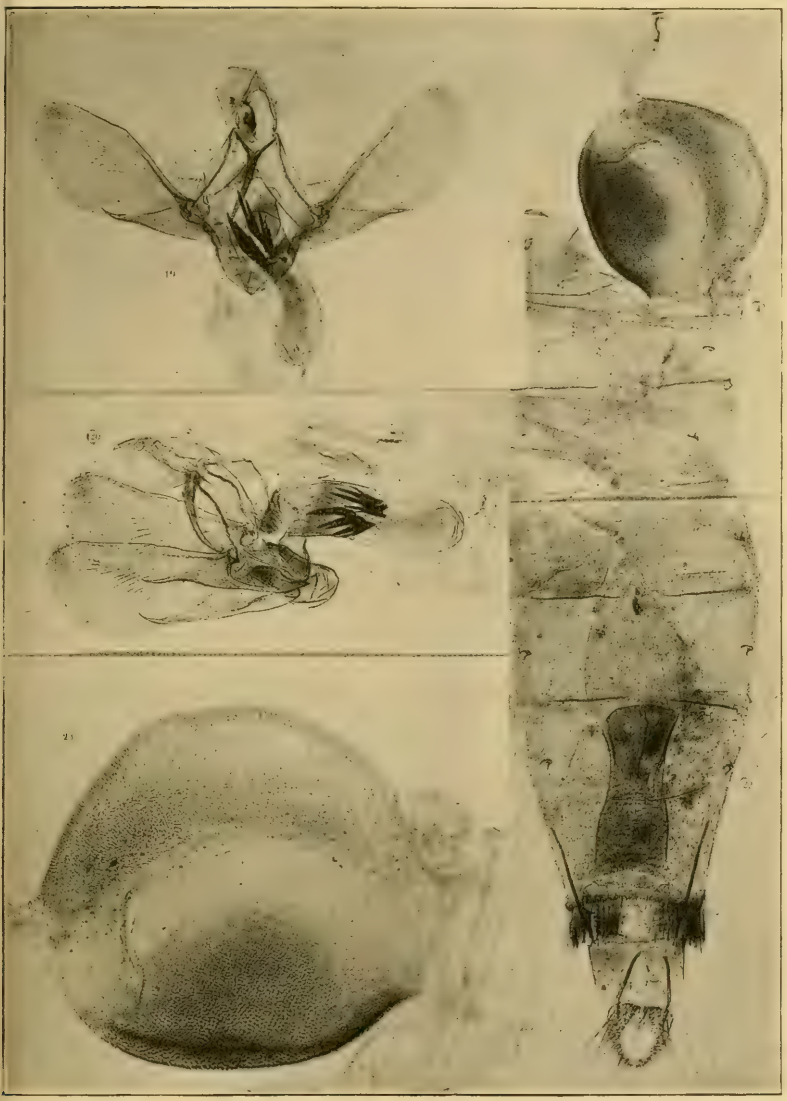
A. E. Tonge, photo. *C. Hentschel.*

SCOPARIA.



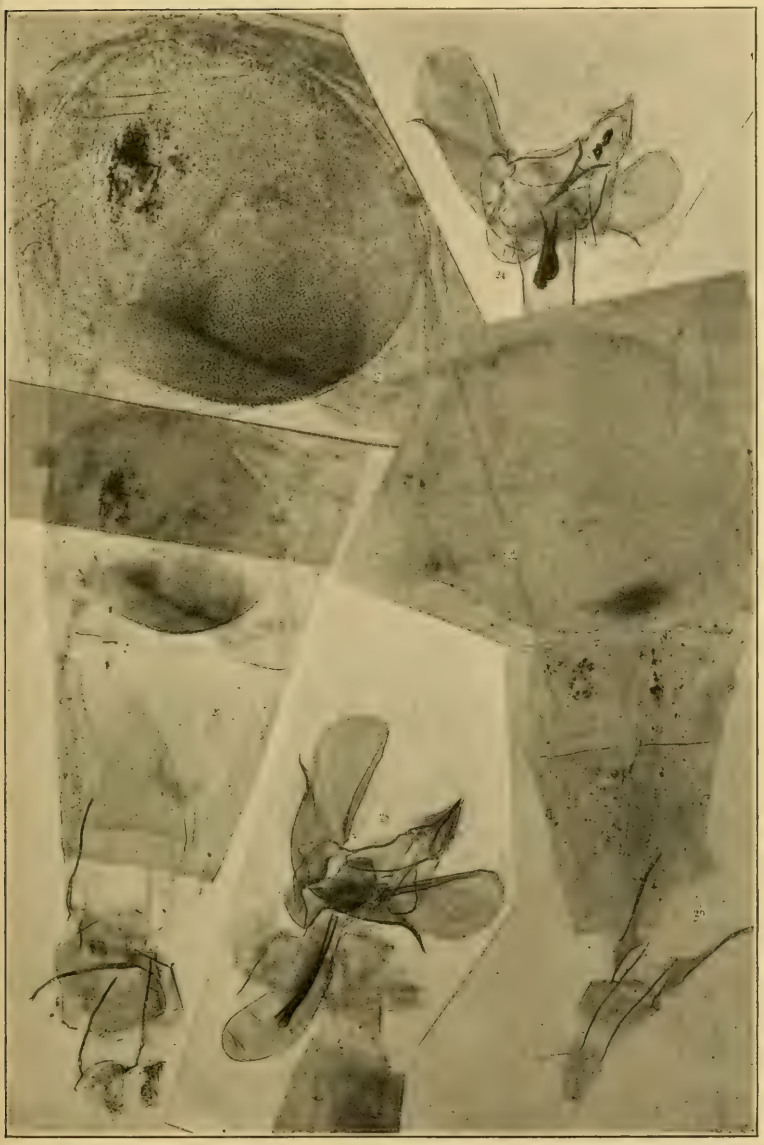
A. E. Tonge, photo. *C. Hentschel.*

SCOPARIA.



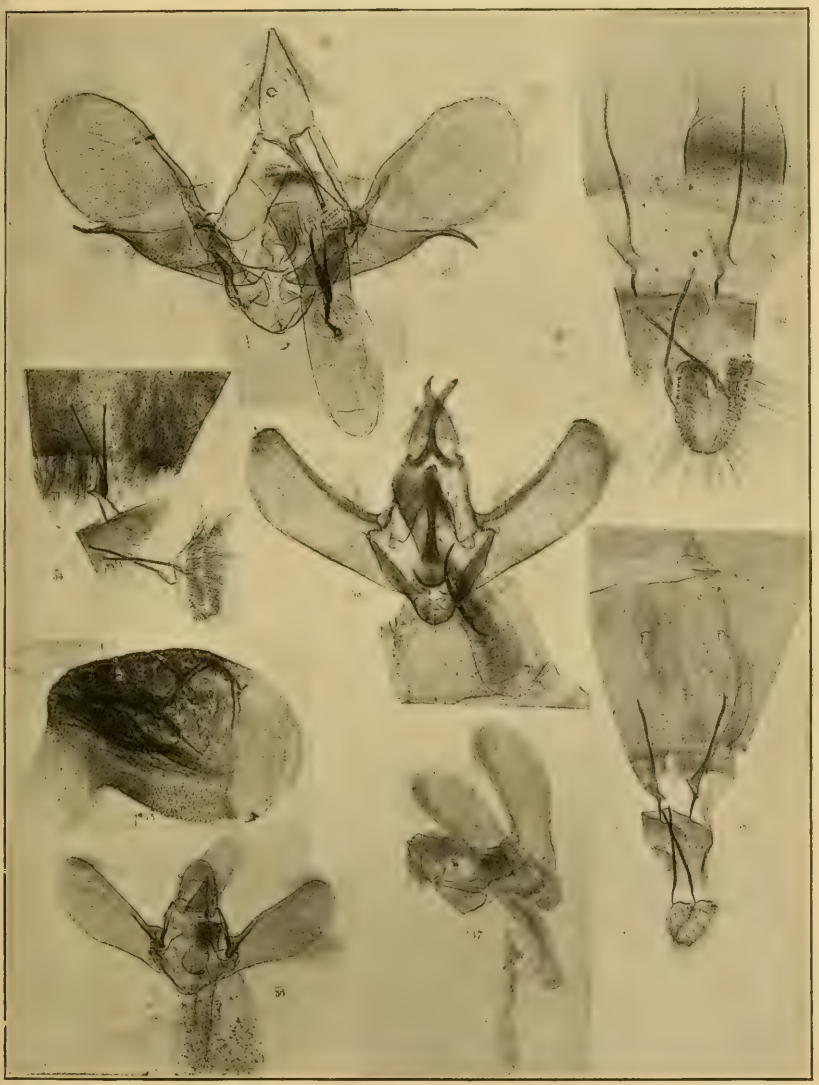
A. E. Tonge, photo. *C. Hentschel.*

SCOPARIA.



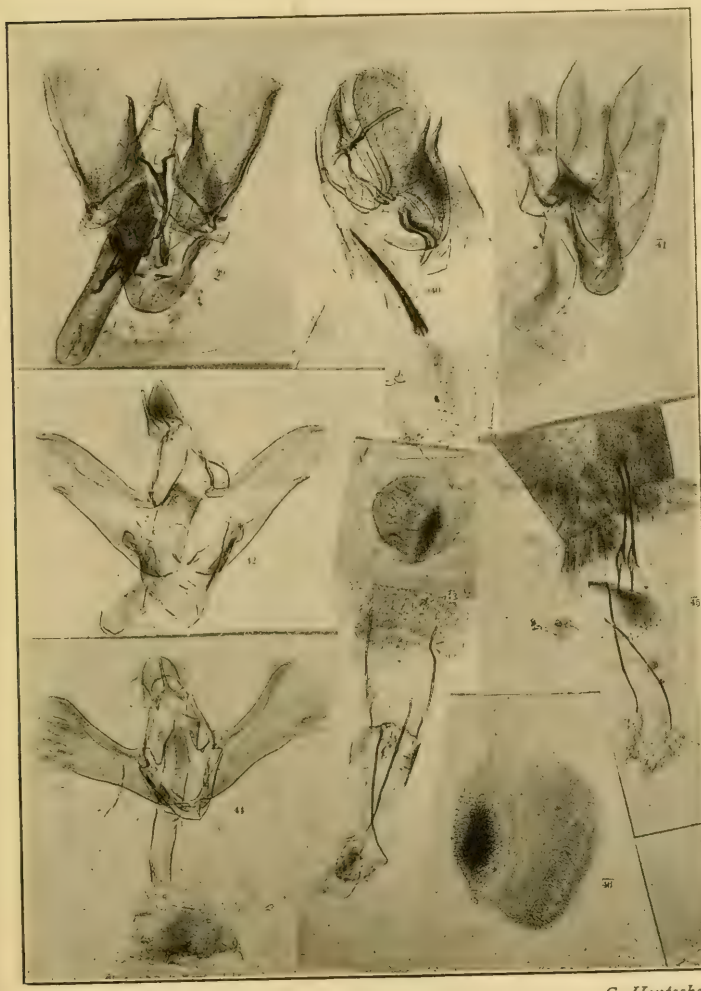
A. E. Tonge, photo. *C. Hentschel.*

SCOPARIA.



A. E. Tonge, photo. *C. Hentschel.*

SCOPARIA, ANARPIA, WITTLESIA.

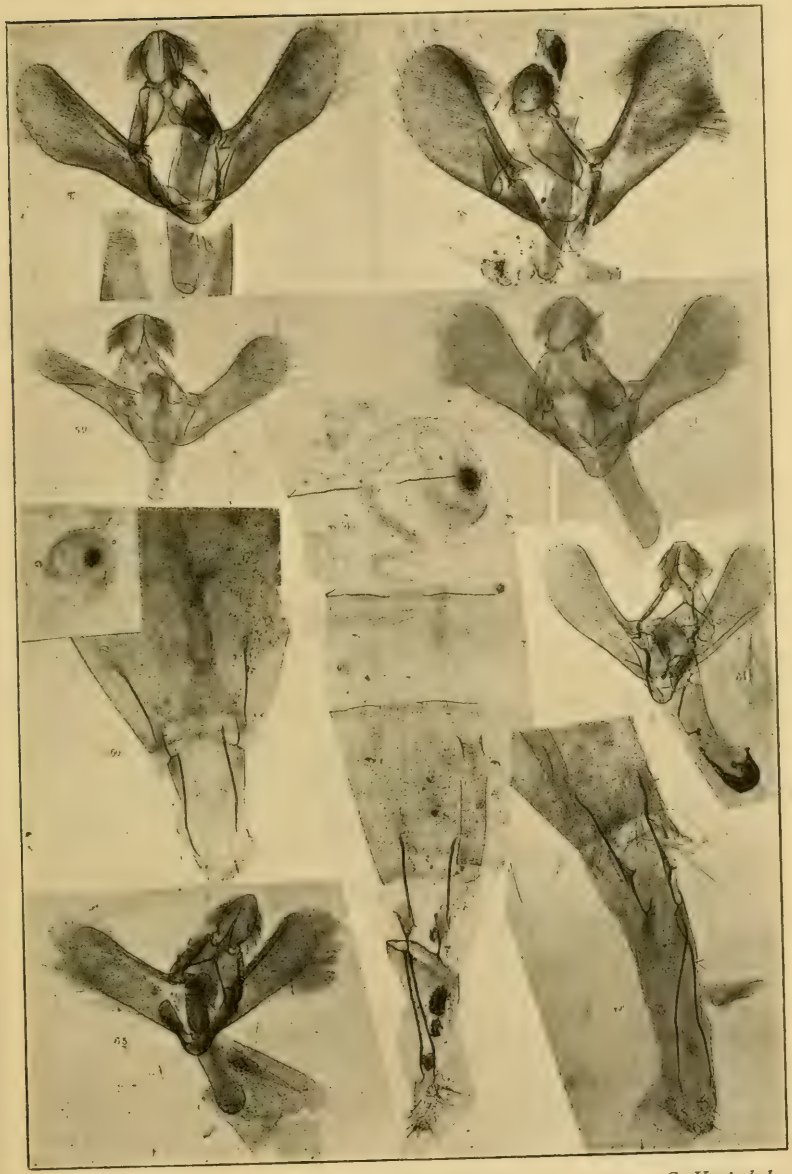


A. E. Tonge, photo. *C. Hentschel.*

SCOPARIA, DIPLEURINA, EUDORIA.

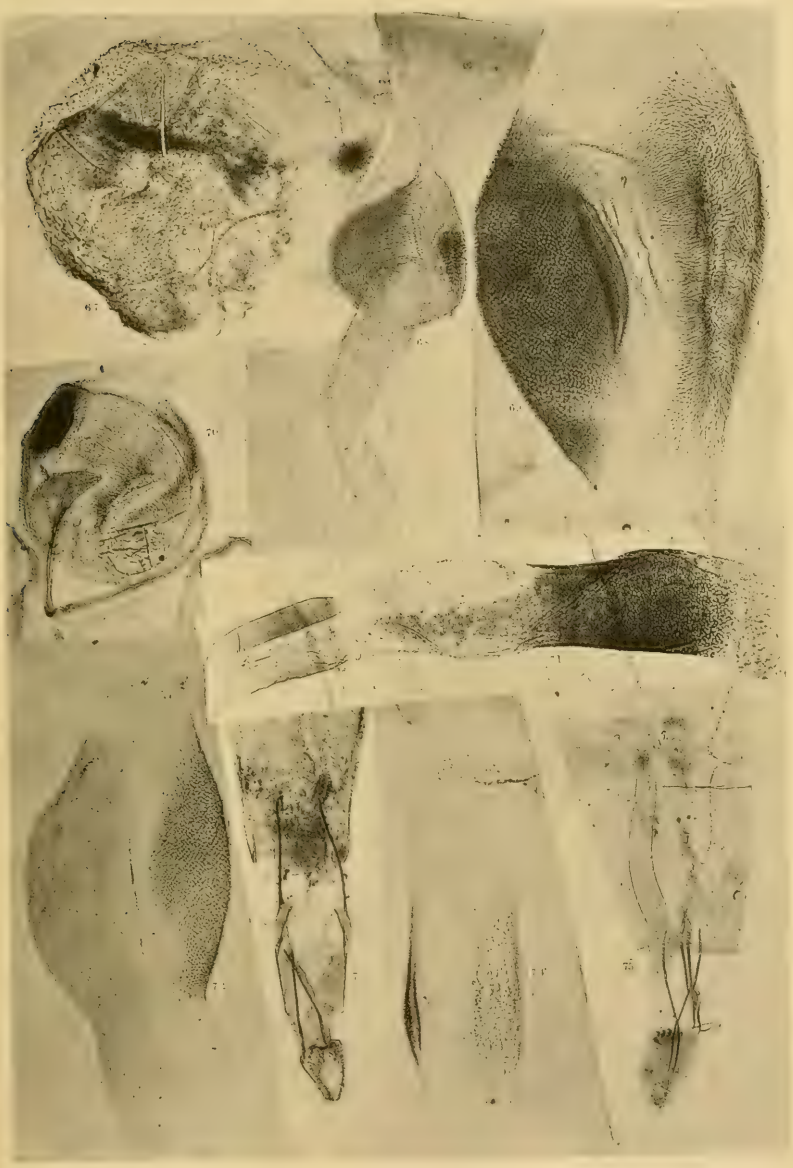
A. E. Tonge, photo. *C. Hentschel.*

EUDORIA.



A. E. Tonge, photo. *C. Hentschel.*

EUDORIA.



A. E. Tonge, photo. *C. Hentschel.*

SCOPARIA, EUDORIA, WITTLESIA.

PLATE XXXVII. FIG. 12. *Scoparia atomalis*, ♂ bursa.
13. „ „ , „ last segments.
14. „ *ulmella*, ♂.
15. „ „ , ♀ bursa.
16. „ „ , „ last segments.
17. *Scoparia manifestella*, ♂.
18. „ „ , ♀ last segments.

PLATE XXXVIII. FIG. 19. *Scoparia basistrigalis*, ♂.
20. „ „ , „ lateral view.
21. „ „ , ♀ bursa.
22. „ „ , „ last segments.
23. „ „ , „ bursa × 40.

PLATE XXXIX. FIG. 24. *Scoparia cembrae*, ♂.
25. „ „ , „ last segments.
26. „ „ , „ bursa.
27. „ „ , „ „ × 40.
28. „ *phaeolenca*, ♂.
29. „ „ , ♀ last segments.
30. „ „ , „ bursa × 40.

PLATE XL. FIG. 31. *Scoparia perplexella*, ♂.
32. „ „ , ♀ last segments.
33. *Anarpia pyrenaealis*, ♂.
34. „ „ , ♀ last segments.
35. „ „ , „ bursa.
36. *Wittlesia pallida*, ♂.
37. „ „ , ♂ lateral view.
38. „ „ , ♀ last segments.

PLATE XLI. FIG. 39. *Scoparia gallica*, ♂.
40. „ *ingratella*, ♂ lateral view.
41. *Dipleurina crataegella*, ♂ lateral view.
42. „ „ , „
43. „ „ , ♀ bursa and last segments.
44. *Eudoria murana*, ♂.
45. „ „ , ♀ last segments.
46. „ „ , ♀ bursa × 40.

PLATE XLII. FIG. 47. *Eudoria truncicolella*, ♂.
48. „ „ , ♀ last segments.
49. „ „ , „ bursa.
50. „ *sudetica*, ♂.
51. „ „ , ♀ bursa.

PLATE XLII.

FIG. 52. *Eudoria sudetica*, ♀ last segments.
53. „ „ , ♂.
54. „ *frequentella*, ♂.
55. „ „ , ♀ last segments.
56. „ „ , „ bursa.

PLATE XLIII.

FIG. 57. *Eudoria alpina*, ♂.
58. „ *valesialis*, ♂.
59. „ *angustea*, ♂.
60. „ „ , ♀ last segments and bursa.
61. „ *lineola*, ♂.
62. „ „ , ♀ last segments.
63. „ „ , „ bursa.
64. „ *laetalis*, ♂.
65. „ *resinea*, ♂.
66. „ *laetalis*, ♀ last segments.

PLATE XLIV.

FIG. 67. *Wittlesia pallida*, ♀ bursa × 40.
68. *Eudoria resinea*, ♀ bursa × 40.
69. *Scoparia perplexella*, ♀ bursa × 40.
70. *Eudoria laetalis*, ♀ bursa × 40.
71. *Scoparia perplexella*, ♀ chitinous tube between bursa and outlet × 30.
72. „ *manifestella*, ♀ × 40.
73. „ *gallica*, ♀ last segments × 20
74. „ „ , ♀ bursa × 40.
75. *Eudoria resinea*, ♀ last segments × 20.

XXII. *Notes on the Genus* Catasticta, *with descriptions of new species.* By Percy I. Lathy, F.Z.S., F.E.S., and W. F. H. Rosenberg, F.Z.S., F.E.S.

[Read March 1st, 1911.]

Plates XLV, XLVI.

On the appearance of the part of Seitz's work on the *Lepidoptera* containing the monograph of *Catasticta*, by J. Röber, we decided to work out the material of this genus in the collection of Mr. Adams, with a view to describing the new species. As we proceeded to do this we found so many errors in Röber's work that we felt compelled to correct these as well as describe the new forms. The only described species of which we have seen neither specimens nor figures are *C. emeris*, Boisd., and *C. rubricata*, Weym. Our thanks are due to Monsieur Le Cerf, of the Paris Museum, for kindly affording us the opportunity of seeing the types of Lucas, and to the Hon. Walter Rothschild for allowing us to see Felder's types.

Catasticta ochracea, Bates.

Euterpe ochracea, Bates, Ent. Mo. Mag., i., p. 31 (1864).

C. ochracea, G., and S. Biologia C. Americana, p. 118, and lix. f. 11, 12, 13 (1889).

Röber omits to mention this Guatemalan form of *nimbice*, Boisd.

Catasticta boliviana, Butl.

C. boliviana, Butl., Ann. Mag. Nat. Hist. (6), 17, p. 54 (1896).

Röber figures this species as *pinava*, Doubld., and compares it with *sinapina*, Butl., a species totally unlike it.

Catasticta vapina, Butl.

C. vapina, Butl., Ann. Mag. Nat. Hist. (6), 20, p. 367 (1897).

This name will have to be sunk as a synonym of *incerta*, Dognin, which has priority. Röber compares this species with *pinava*, Röb. = *boliviensis*, Butl., a very different thing, as may be seen by Dognin's figure.

Catasticta philomene, Röb.

C. philomene, Röb. Seitz Macrolepidoptera Faun. Amer., vol. ii, part 8, p. 71 (1909).

Specimens that we have received from Staudinger under the manuscript name of *philomene* are identical with *colla*, Doubld.

Catasticta hopfferi, Röb.

C. hopfferi, Röb, Seitz Macrolepidoptera Faun. Amer., vol. ii, part 8, p. 71 (1909).

This is identical with *pinava*, Doubld.

Catasticta hegemon, G. and S.

C. hegemon, G. and S., Biologia C. Americana, vol. ii, p. 120, and lxiv, f. 21–4 (1889).

Röber makes no reference to this species.

Catasticta strigosa, Butl.

C. strigosa, Butl., Ann. Mag. Nat. Hist. (6), 17, p. 54 (1896).

Staudinger and Bang-Haas have sent this species out under the name of *modesta*, Luc., and Röber evidently accepted this as correct, as he figures it as such. *C. modesta*, Luc., however, is quite a different species and more nearly allied to *pinava*, Doubld.

Catasticta amastris, Hew.

Euterpe amastris, Hew., Bol. Butt., p. 3 (1874).

This is another species overlooked by Röber, and on our examining the type in the British Museum we found it to be the female of *niobe*, Röber, which name, of course, will have to sink as a synonym.

Catasticta cerberus, G. and S.

C. cerberus, G. and S., Biologia C. Americana, vol. ii, p. 120, and lxiv, f. 19, 20 (1889).

A species of which Röber makes no mention; it is allied to the preceding.

Catasticta apaturina, Butl.

C. apaturina, Butl., Entom., 34, p. 302 (1901).

Röber's figure does not agree with the type, which has a white band on the hindwing; it appears to approach more nearly to our new species *C. truncata*.

Catasticta cora, Lucas.

Euterpe cora, Lucas, Rev. Zool., 1852, p. 196.

Nobody appears to have identified this species correctly. Röber figures *cinerea*, Butl., under this name. In the British Museum *cora*, Luc., and *zancle*, Feld., are supposed to be synonymous. However, when we examined the types we found that the species sent out by Staudinger and figured by Röber as *paradoxa* is identical with *cora*, Luc.

Catasticta radiata, Koll.

Euterpe radiata, Koll., Denkschr. Akad. Wiss. Wien., Math. Nat. Cl., i, p. 359, *n.* 20 and 45, f. 3, 4 (1850).

We do not know what species Röber has identified as *radiata*, Koll., but he has evidently made a mistake, as we have had the opportunity of examining a good series, and we have not been able to find any specimens with the underside of hindwing much marked with red.

Catasticta alma, Hopff.

Euterpe alma, Hopff., S.E.Z., 1874, p. 330, *n.* 2.

This species is nearly allied to *C. teutanis*, Hew., and has nothing to do with *sisamnus*, Fabr.

Catasticta troezene, Felder.

Euterpe troezene, Feld., Reise Nov., Lep., ii, p. 154, *n.* 121 and 23, f. 2, 3 (1865).

Röber has evidently been misled by Felder's extremely bad figure of this species, as, on examination of the type, we find it is much more like *troezenides*, Röb., which is undoubtedly a subspecies of *troezene*, Feld.

Catasticta affinis, Röb.

C. affinis, Röb., Seitz., Macrolepidoptera, Faun. Amer., vol. ii, part 11, p. 105 (1909).

This appears to be identical with *C. philone*, Feld., a species which Röber makes no mention of.

Catasticta potamea, Feld.

Euterpe potamea, Feld., Wien. Ent. Mon., v, p. 78, *n.* 22 (1861).

Another species omitted by Röber.

Catasticta philais, Feld.

Euterpe philais, Feld., Reise Nov., Lep., ii, p. 149, *n.* 117 (1865).

This species also left out by Röber.

Catasticta rubricata, Weym.

C. rubricata, Weym., Iris xx, p. 25 (1907).

Judging from the description, this appears to be either the female of *C. strigosa*, Butl., or a female of a species allied to *C. alma*, Hopff. Röber makes no mention of it.

Catasticta incerta, Dogn.

C. incerta, Dogn., Le Naturaliste, p. 48 (1888); Lep. Loja, ii, p. 46, 3, f. 4 (1891).

Röber appears to think this is a subspecies of *manco*, Doubld.; it is, however, quite a distinct species, the ground colour of *manco*, Doubld., being grey, similar to that of our new species *leucophaea*.

Catasticta pharnakia, Fruhs.

C. pharnakia, Fruhs., Soc. Ent., 22, p. 116 (1907).

Röber places this species in the genus *Archonias*, but we are inclined to think that its proper place is in *Catasticta*, near *strigosa*, Butl. Our reasons for this are the shape of the forewings, which are not so elongated as in *Archonias*, and the position of the second subcostal nervure of the forewing, which arises from just before end of cell.

Catasticta dentata, sp. nov. (Pl. XLV, figs. 1 and 2.)

♂. Upperside. Forewing similar to *amastris*, Hew., but white markings more conspicuous, and has marginal white spots near apex. Hindwing with series of sagittate white markings beyond cell and submarginal whitish spots. Underside, both wings similar to amastris, Hew., but somewhat paler.

♀. Upperside. Both wings similar to male, but basal half white and other white markings more conspicuous. Underside. Forewing similar to male, but basal half white. Hindwing as in male.

Exp. ♂ 59 mm., ♀ 64 mm.

Acopampa, S. Peru: 11,500 ft., Feb., March, 1910 (*H. and C. Watkins*), 1 ♂, 1 ♀.

This is the Peruvian form of *amastris*, Hew. As the species of this genus have such a similar pattern on the underside we have not thought it necessary to give a

detailed description of each, but have in all cases compared the new species with the one most nearly allied and also figured them.

Catasticta albofasciata, sp. nov. (Pl. XLV, fig. 3.)

♂. Near *uricoecheae*, Feld. Upperside. Forewing has discal white band and has submarginal spots much smaller and red area of hindwing considerably restricted. Underside. Forewing has more white on discal area, and hindwing has yellow markings rather more prominent.

Exp. 54 mm.

Maganja, COLOMBIA: 9,000 ft., Feb. 1910, 1 ♂.

There is a second specimen in the Godman and Salvin collection in the British Museum.

Catasticta seitzi, sp. nov. (Pl. XLV, fig. 4.)

♂. Near *zancle*, Feld., but ochreous markings of both wings above much more restricted, especially on hindwing.

Exp. 48 mm.

Guabinas, RIO CAUCA, W. COLOMBIA: Jan. 1908, 1 ♂.

Catasticta watkinsi, sp. nov. (Pl. XLV, fig. 5.)

♂. Near *pinava*, Doubld., on upperside, but with bright ochreous markings which are more extended than the olivaceous markings of *pinava*, Doubld. The underside of the forewing differs in a similar manner, while the hindwing lacks the distinct discal dark band, and sub-basal and submarginal white markings of *pinava*, Doubld.

Exp. 52 mm.

Uruhuasi, S. PERU: 7,000 ft., March, April, 1910 (*H. and C. Watkins*), 7 ♂ ♂.

Catasticta distincta, sp. nov. (Pl. XLV, fig. 6.)

♂. Allied to *suadila*, Hopff., but with grey markings on upperside very much more extended. The underside of forewing is much whiter, and the discal black band of hindwing much more pronounced.

Exp. 57 mm.

Rio Colorado, PERU: 2,500 ft., Aug. 1903 (*Watkins and Tomlinson*), 1 ♂ type; La Merced, PERU: 2,500 ft., Aug. 1903 (*Watkins and Tomlinson*), 1 ♂; Huancabamba, N.E. PERU: (*Boettger*) 2 ♂ ♂.

Catasticta leucophaea, sp. nov. (Pl. XLV, fig. 7.)

♂. Similar to *manco*, Doubld., in colour above, but apex of forewing more truncate, and hindwing more rounded and with less grey. The underside of forewing is very much darker and the hindwings more suffused with grey and yellow markings deeper.

Exp. 56 mm.

Uruhuasi, S. Peru: 7,000 ft., March, April, 1910 (*H. and C. Watkins*), 1 ♂ type; Huancabamba, N.E. Peru: 3–10,000 ft., 1 ♂.

The specimen from Huancabamba is smaller and not so brightly coloured below.

Catasticta lanceolata, sp. nov. (Pl. XLV, fig. 8.)

♂. Upperside appears to be identical with figure of *incerta*, Dogn., but differs below in absence of prominent subapical white markings of forewing and in hindwing by exceedingly lanceolate type of marking.

Exp. 53 mm.

Torne, Cauca Valley, Colombia: Aug. 1907, 12 ♂ ♂.

Catasticta minor, sp. nov. (Pl. XLV, fig. 9.)

♂. Allied to *anaitis*, Hew., but much smaller, grey markings darker, and submarginal grey spots considerably larger; on the undersurface the whitish markings much less distinct.

Exp. 58 mm.

San Ramon, Peru: 3,000 ft., Oct. 1903 (*Watkins and Tomlinson*), 2 ♂ ♂ type; Rio Colorado, Peru: 2,500 ft., March, April, 1903 (*Watkins and Tomlinson*), 1 ♂.

Catasticta subflava, sp. nov. (Pl. XLVI, fig. 7.)

♂. Uppersurface somewhat similar to *bithys*, Hübn., but apex of forewing truncate and discal bands yellowish. The underside of both wings is very different owing to the predominance of the bright yellow markings.

Exp. 54 mm.

Huancabamba, N.E. Peru: 3–10,000 ft., 1 ♂.

Catasticta punctata, sp. nov. (Pl. XLVI, fig. 1.)

♂. Upperside similar to preceding, but discal bands slightly darker and no marginal spots on hindwing. The undersurface is

very different, more resembling that of *colla*, Doubld., but with yellow markings instead of orange.

Exp. 56 mm.

Uruhuasi, S. PERU: 7,000 ft., March, April, 1910 (*H. and C. Watkins*), 12 ♂♂ type; Cuzco, PERU: 1 ♂.

The specimen from Cuzco has the discal bands of wings above not so yellowish.

Catasticta hübneri, sp. nov. (Pl. XLVI, fig. 2.)

♂. Somewhat similar to preceding but above discal bands more distinct; while undersurface of forewing is entirely devoid of yellow markings.

Exp. 54 mm.

PERU: 1 ♂.

This specimen was received from Staudinger and Bang-Haas under the above manuscript name.

Catasticta aureomaculata, sp. nov. (Pl. XLVI, fig. 3.)

♂. Near *pinava*, Doubld., but larger, submarginal markings of hindwings less sagittate. The undersurface is similar in pattern but darker, and marking rich orange instead of yellow.

Exp. 56 mm.

Uruhuasi, S. PERU: 7,000 ft., March, April, 1900 (*H. and C. Watkins*), 1 ♂.

Catasticta suffusa, sp. nov. (Pl. XLVI, fig. 4.)

♂. Similar to *pinava*, Doubld., but above the markings of forewing are more extended, while the hindwing is completely suffused with olivaceous and has marginal lunules much more distinct. The underside of forewing has ground colour much paler and ochreous markings more extended, while the hindwing has larger yellow markings and much less prominent white bands.

Exp. 50 mm.

Huancabamba, N.E. PERU: 3–10,000 ft., 2 ♂♂.

Catasticta albina, sp. nov. (Pl. XLVI, fig. 5.)

♂. Closely allied to *alma*, Hopff., but the upper disco-cellular white markings more extended and almost joining submarginal spots.

Exp. 64 mm.

Farinas, Bolivia: 1 ♂.

There are other specimens in the British Museum collection.

Catasticta truncata, sp. nov. (Pl. XLVI, fig. 6.)

♂. Nearly allied to *apaturina*, Butl., but spots on forewing above yellowish, hindwing more produced at anal angle and discal band yellow instead of white. Undersurface has no yellow markings, only small orange ones.

Exp. 50 mm.

Merida, Venezuela.

It is quite possible that this is the species figured by Röber as *apaturina*, Butl.

Catasticta superba, sp. nov. (Pl. XLV, fig. 10.)

♂. Near *chrysolopha*, Koll., but very much larger, and discal band of hindwing above entirely orange. The ground colour of hindwing below is uniform pale yellow and not shaded with darker as in *chrysolopha*, Koll.

Exp. 62 mm.

Uruhuasi, S. Peru: 7,000 ft., Feb. to May, 1910 (*H. and C. Watkins*), 8 ♂♂.

Catasticta similis, sp. nov. (Pl. XLVI, fig. 8.)

♂. Very near the preceding but smaller and differs in the shorter hindwings, smaller discal orange band and in ochreous margin of inner margin only extending half-way from base.

Exp. 53 mm.

Uruhuasi, S. Peru: 7,000 ft., April, May, 1910 (*H. and C. Watkins*), 2 ♂♂.

Catasticta flavomaculata, sp. nov.

We have given this name to the southern form of *teutila*, Doubld., typical specimens of which are northern and have orange markings below. Costa Rican specimens have yellow markings below, and in Guatemala intermediate forms are to be found, therefore this new name must only be regarded as subspecific. Typical *teutila*, Doubld., have also white bands. *Sebennica*, Luc., is identical with *teutila*, Doubld., and *endoica*, Reak., is the female.

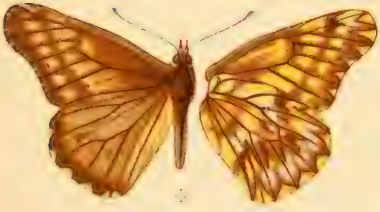
F. C. Knight del.

NEW SPECIES OF CATASTICTA

Explanation of Plate XLV.

Fig.

1. *Catasticta dentata*, sp. n., ♂, p. 522.
2. *Catasticta dentata*, sp. n., ♀, p. 522.
3. *Catasticta albofasciata*, sp. n., ♂, p. 523.
4. *Catasticta seitzi*, sp. n., ♂, p. 523.
5. *Catasticta watkinsi*, sp. n., ♂, p. 523.
6. *Catasticta distincta*, sp. n., ♂, p. 523.
7. *Catasticta leucophaea*, sp. n., ♂, p. 524.
8. *Catasticta lanceolata*, sp. n., ♂, p. 524.
9. *Catasticta minor*, sp. n., ♂, p. 524.
10. *Catasticta superba*, sp. n., ♂, p. 526.



West, Newman chr.

NEW SPECIES OF CATASTICTA

Explanation of Plate XLVI.

Fig.

1. *Catasticta punctata*, sp. n., ♂, p. 524.
2. *Catasticta hübneri*, sp. n., ♂, p. 525.
3. *Catasticta aureomaculata*, sp. n., ♂, p. 525.
4. *Catasticta suffusa*, sp. n., ♂, p. 525.
5. *Catasticta albina*, sp. n., ♂, p. 525.
6. *Catasticta truncata*, sp. n., ♂, p. 526.
7. *Catasticta subflava*, sp. n., ♂, p. 524.
8. *Catasticta similis*, sp. n., ♂, p. 526.
9. *Catasticta susiana*, Hopff., ♀, p. 527.
10. *Catasticta manco* Doubld., ♀, p. 527.

Catasticta intermedia, sp. nov.

♂. Very similar to *innuba*, Röb., but larger and paler, the markings of hindwing below much yellower.

Exp. 54 mm.

Uruhuasi, S. Peru: 7,000 ft., March to May, 1910 (*H. and C. Watkins*), 12 ♂♂.

This form is intermediate between *innuba*, Röb., and *pieris*, Hew.

We have not thought it necessary to figure the last two forms, as the typical forms in each case are so well known that one cannot mistake them.

Catasticta susiana, Hopff. (Pl. XLVI, fig. 9.)
Euterpe susiana, Hopff., S.E.Z., 1874, p. 329.

♀. Differs from the male in the pale markings being more extended and of a whitish colour.

An example from Ecuador.

Catasticta manco, Doubld. (Pl. XLVI, fig. 10.)
Euterpe manco, Doubld., Ann. Nat. Hist., xix, Ser. ii, vol. i, p. 121 (1848).

♀. Upperside, basal two-thirds of forewing white, hindwing white with dark marking of undersurface showing through, a blackish patch beyond end of cell, and sagittate black markings on margin. Underside similar to male but paler.

One specimen from Uruhuasi, S. Peru: 7,000 ft., April, May, 1910 (*H. and C. Watkins*).

Explanation of Plates XLV, XLVI.

[*See Explanation facing the* Plates.]

XXIII. *South African* Aculeate Hymenoptera *in the Oxford Museum.* By the late Col. C. T. Bingham, F.Z.S. With Introduction by Prof. E. B. Poulton, D.Sc., M.A., F.R.S.

[Read May 3rd, 1911.]

The Hope Department having in recent years received many accessions to its collection of South African *Hymenoptera Aculeata*, I asked my friend the late Col. C. T. Bingham if he would work out the material, preparing a list and describing the new forms. He agreed with me that such a memoir would be of value to the students of African insects, and he consented to undertake it in the intervals of other work. I brought the whole of the material to the Natural History Museum and, from time to time during the last few years of his life, he devoted himself to its study. He often showed me the parts of the collection he had worked out and the gradually increasing pile of manuscript. What Col. Bingham had accomplished at the time of his lamented death is now given to the world in the following paper, which also includes the description of a new South African Aculeate from the collections made in 1905 by Dr. F. A. Dixey and Dr. G. B. Longstaff, and submitted to the author by the naturalist last named.

The source of each of the examples studied by Col. Bingham is clearly indicated in the paper, but I may mention that, in addition to the South African examples in the W. W. Saunders Collection, the following recently-made collections were submitted to the author: the specimens collected by Mr. S. A. Neave in Northern Rhodesia; by Mr. Guy A. K. Marshall in S. Rhodesia, chiefly the Salisbury District; by Dr. F. N. Brown in the Orange River Colony and Natal; by Mr. G. F. Leigh and Mr. F. Muir in Natal.

The types of all the descriptions are in the Hope Department of the Oxford University Museum.

In presenting the labours of the lamented naturalist to the Society, I have acted throughout under the skilled advice of his friend and fellow-worker Mr. Rowland E. Turner.

E. B. Poulton.

FOSSORES.

Family MUTILLIDAE.

1. Mutilla atropos, Smith.

Mutilla atropos, Sm., Cat. Hym. B.M., iii, 1855, p. 22 ♂; André, Zeit. Hym. Dipt., iii, 1903, p. 235.
Mutilla albistyla, Sauss., in Dist., Naturalist in the Transvaal, 1892, p. 25, pl. 4, fig. 7 ♂.
Mutilla artemisia, Pér., Ann. S.A. Mus., i, 1899, p. 368.

Natal ♂ (*Coll. W. W. Saunders*). Rhodesia: Mashonaland, Salisbury 5000 ft. ♂ (*G. Marshall*); Loangwa District, Petauké 1700–2400 ft. ♂ (*S. A. Neave*). Originally described from Natal. Type in the British Museum, also other specimens from Lake Ngami and from Angola.

2. Mutilla minos, Smith.

Mutilla minos, Sm., Cat. Hym. B.M., iii, 1855, p. 16 ♂.

Rhodesia: Mashonaland, Salisbury 5000 ft. ♂ (*G. Marshall*); Loangwa District, Petauké 1700–2400 ft. ♂, Fort Jameson 3000 ft. ♂ (*S. A. Neave*).

3. Mutilla purpurata, Smith.

Mutilla purpurata, Sm., Descr. New sp. Hym. B.M., 1879, p. 190 ♂; Pér., Ann. S.A. Mus., i, pt. i, 1898, p. 60 ♀ and pt. ii, 1899, pl. 8, figs. 6, 14 ♀ ♂; André, Zeit. Hym. Dipt., ii, 1902, p. 33.

Rhodesia: Mashonaland, Salisbury 5000 ft. ♂ (*G. Marshall*). Originally described from Natal. Type ♂ in B.M., also other specimens from Natal and B.E. Africa. Type ♀ in S.A. Museum, Cape Town.

4. Mutilla psammathe, Péringuey.

Mutilla psammathe, Pér., Ann. S.A. Mus., i, pt. 2, 1899, p. 356 ♂ ♀.

Natal ♂ ♀ in cop. (*F. Muir*). Types in S.A. Mus. from Zambesia (*G. Marshall*).

5. Mutilla charaxus, Smith.

Mutilla charaxus, Sm., Cat. Hym. B.M., iii, 1855, p. 17 ♂.

S. Africa ♂ (*Coll. W. W. Saunders*). Rhodesia: Mashonaland, Salisbury 5000 ft. ♂, Buluwayo ♂ ♀ in cop. Dec. 1903 (*G. Marshall*).

♀. Head and abdomen black, thorax dark red. Head, thorax, and abdomen covered with erect black hairs. Head about as broad as the thorax anteriorly, covered with coarse, somewhat greyish pile, beneath which it is closely punctured; mandibles acute at tip with a small preapical tooth on their inner margins; antennae opaque, the scape covered with pile similar to that on the front and vertex, 1st joint of the flagellum very short, 2nd twice as long as the 3rd; eyes oval, rather small, equidistant from the occiput and the base of the mandibles. Thorax: strongly punctured above, the sides excavate and smooth. Seen from above, the thorax is narrow and rounded anteriorly, emarginate at the sides and distinctly broadened posteriorly; the dorsal surface convex, passing evenly and roundly into the posterior vertical face, which is slightly concave in the centre; legs black, covered with whitish hairs; the calcaria and the single row of spines on the intermediate and posterior tibiae white; claws simple, pale reddish-brown. Abdomen somewhat densely covered with short black pile, beneath which it is closely punctured; 1st segment immaculate beneath, longitudinally carinate, with a single somewhat deep emargination in the middle, 2nd segment with two rounded pubescent spots side by side placed closer to the base than to the apex of the segment, the lateral edges of the dorsal plate with a short longitudinal line of red; 3rd segment with a transverse band of dense white pubescence broadly interrupted in the middle, apex of the dorsal and the apices of the 2nd to the 5th ventral segments conspicuously fringed with white hairs, pygidial area clearly defined, flat and finely punctured.

Length ♀ 8 mm.

Described from the single ♀ taken in cop. at Buluwayo by Mr. G. A. K. Marshall.

From the ♀ of *M. leucopyga*, it can be distinguished by the shape of the thorax, which in *leucopyga* has the sides parallel, and by the proportion of the joints of the flagellum of the antennae.

6. Mutilla medon, Smith.

Mutilla medon, Sm., Cat. Hym. B.M., iii, 1855, p. 20 ♂; Sich. and Radoszk., Hor. Soc. Ent. Ross., vi, 1869, p. 239, pl. 21, fig. 12 ♂.

NATAL: Durban ♂ ♀ in cop. (*G. F. Leigh*). RHODESIA: Mashonaland, Salisbury ♂ ♀ in cop. Nov. 19, 1905 (*G. Marshall*); Loangwa District, Petauké 1700–2400 ft. ♂ (*S. A. Neave*). Type in B.M. from the Congo, also other specimens from Natal and from Beira in Portuguese East Africa.

♀. Head and abdomen black, thorax red. Head, thorax and abdomen covered with short erect black hairs, sparse on the head and abdomen, somewhat more thickly set on the thorax. Head slightly broader than the thorax anteriorly, closely punctured; mandibles acute with a preapical short, blunt tooth on their inner edges; antennae opaque, the scape closely set with short pale pubescence; antennal tubercles red; 2nd joint of the flagellum incrassate towards the apex, twice as long as the 3rd, 3rd and 4th subequal; eyes oval, placed equidistant from the base of the mandibles and the occiput. Thorax rectangular, slightly convex above, rounded anteriorly, the pronotal lateral angles not prominent, sides slightly emarginate, posterior face vertical. Seen from above the thorax is not broader anteriorly than posteriorly; legs black covered with whitish hairs, the single row of spines on the intermediate and posterior tibiae and the calcaria white. Abdomen finely punctured, the punctures shallow; 1st segment immaculate, longitudinally carinate below, the carina terminating posteriorly in a vertical tooth; 2nd segment with two pubescent white spots side by side above; 3rd and 4th segments with pubescent white bands above, both bands broadly interrupted in the middle; apex of 5th segment above and apices of 2nd to 5th ventral segments fringed with long white hairs, those fringing the 5th dorsal segment falling over and completely shading a well-defined, flat and longitudinally striate pygidial area.

Length ♀ 8–13 mm.

NOTE.—The ♀ taken in cop. at Salisbury, Nov. 19, 1905, by Mr. Marshall, had been placed at the head of the series by Col. Bingham, and has been considered as the type of the above description of this sex.—E. B. P.

7. MUTILLA PREDATRIX, Smith.

Mutilla predatrix, Sm., Descr. New sp. Hym. B.M., 1879, p. 191 ♀.

NATAL ♀ (*Coll. W. W. Saunders*). RHODESIA: Mashonaland, Salisbury 5000 ft. ♀, Umtali 3700 ft. ♀ (*G. Marshall*). Type in the B.M. from Natal, also other specimens from Delagoa Bay and Zululand.

8. Mutilla decipiens, Smith.

Mutilla decipiens, Sm., Descr. New sp. Hym. B.M., 1879, p. 194 ♀.

Natal ♀ (*Coll. W. W. Saunders*). Type in B.M., also other specimens from Natal.

9. Mutilla speculatrix, Smith.

Mutilla speculatrix, Sm., Descr. New sp. Hym. B.M., 1879, p. 194 ♀; Pér., Ann. S.A. Mus., i, pt. 1, 1898, p. 88 ♂.

Natal ♀ (*Coll. W. W. Saunders*). Type in B.M., also other specimens from Natal. A single ♀ in B.M. from S. Nigeria (*D. A. MacAlister*).

10. Mutilla sinuosiceps, André.

Mutilla sinuosiceps, André, Zeits. Hym. Dipt., ii, 1902, p. 27 ♂.

Rhodesia: Mashonaland, Salisbury 5000 ft. ♂ (*G. Marshall*).

11. Mutilla argenteiventris, André.

Mutilla argenteiventris, André, Zeits. Hym. Dipt., ii, 1902, p. 25 ♂.

Rhodesia: Mashonaland, Salisbury 5000 ft. ♂ (*G. Marshall*).

12. Mutilla péringueyi, André.

Mutilla péringueyi, André, Zeits. Hym. Dipt., ii, pt. 1, 1902, p. 25 ♂.

Estcourt: Natal 4000 ft. ♂ ♀ in cop. Jan. 1897 (*G. Marshall*).

♀. Black, the mandibles anteriorly in the middle, the antennal tubercles, the apex of the scape of the antennae and the thorax above and on the sides red; head, thorax and abdomen covered with erect black hairs, the abdomen with close-set recumbent short black pubescence, and apical white pubescent bands on the basal three segments, the bands on the 2nd and 3rd segments medially widely interrupted. Head not wider than the thorax in front, transversely rectangular convex in front, very slightly arched posteriorly, finely and closely punctured; mandibles acutely pointed with a small

preapical tooth on their inner edges; clypeus rounded anteriorly, flat with a small shining tubercle at base. Antennae: 2nd joint of the flagellum twice as long as the 3rd, 3rd and 4th subequal; eye rounded, convex, the vertex arched, the sides of the head behind the eyes well developed. Thorax elongate, broader anteriorly than posteriorly, the sides slightly crenulate, above closely and coarsely punctured, the punctures running into longitudinal striae or fine grooves, posteriorly obliquely sloped; the sides of the median segment carinate; the pleurae smooth, legs shining, intermediate and posterior tibiae with a single row of short distant spines; calcaria short, yellowish-white. Abdomen sessile, ventral carina of the basal segment feebly emarginate as in the ♂; 6th segment convex without a pygidial area.

Length ♀ 8 mm.

13. Mutilla alecto, Smith.

Mutilla alecto, Sm., Cat. Hym. B.M., iii, 1855, p. 17 ♂; André, Wytsman's Gen. Ins. Hym., Fasc. 11, 1903, p. 35.

Guinea ♂ (*Coll. W. W. Saunders*). Natal ? ♂ (*Coll. W. W. Saunders*).

14. Mutilla leucopyga, Klug.

Mutilla leucopyga, Klug, Symb. Phys., 1829, dec. 1, pl. 4, fig. 10 ♀; André, Zeits. Hym. Dipt., ii, pt. 1, 1902, p. 22.

Mutilla opaca, Lep., Hist. Nat. Hym., iii, 1845, p. 624 ♂.

Mutilla persephone, Pér., Ann. S.A. Mus., i, 1898, p. 69; id. tom. cit. 1899, pl. 8, figs. 11, 13 ♀ ♂.

Natal ♀ (*Coll. W. W. Saunders*). Rhodesia: Mashonaland, Salisbury 5000 ft., and Buluwayo ♀ ♀ (*G. Marshall*).

15. Mutilla cytheris, Péringuey.

Mutilla cytheris, Pér., Ann. S.A. Mus., i, pt. 2, 1899, p. 372 ♂.

Rhodesia: Mashonaland, Salisbury 5000 ft. ♂ (*G. Marshall*).

The two succeeding forms have, so far as I can make out, not been previously described. Both so closely resemble *Dolichomutilla guineensis*, Fabr., that they might easily be mistaken for that form; both belong, however,

to the genus *Mutilla* and not to *Dolichomutilla*, Ashmead, as defined by André (*Genera Insectorum. P. Wytsman. Hymenoptera*).

16. Mutilla secreta, form n.

N. E. Rhodesia: Loangwa River 1700 ft.: June 7, 1905; and Petauké, Nov. 27, 1905 (*S. A. Neave*).

♀. Black shining with sparsely scattered erect white hairs, the abdomen more densely clothed with recumbent black hairs. Head subquadrate closely and coarsely punctured, as wide as the thorax in front; clypeus overhung with a dense fringe of white hairs; mandibles acute, slightly reddish in the middle; eyes ovate, large, closer above to the occiput than below to the base of the mandibles; head behind the eyes rounded and broad. Thorax rectangular, the sides nearly parallel, the pronotum slightly arched anteriorly, the median segment obliquely but steeply sloped posteriorly, the whole thorax above very closely and coarsely punctured; seen from above the intervals between the punctures on the median segment have the appearance of an arched row of short spines, the sides of the thorax nearly smooth with one or two wide reticulations on the mesopleurae, the mesopleurae obliquely bicarinate; legs slender, intermediate and posterior tibiae with a double row of short black spines, the calcaria white. Abdomen sessile; basal segment short immaculate, ventral carina incised in the middle; 2nd segment with two transversely placed pubescent round white spots; 3rd and 4th segments with broad pubescent white bands, that are widely interrupted in the middle on both segments; 6th segment fringed and overhung with white hairs, convex and smooth towards apex with no defined pygidial area, below with a single small median tubercle; 2nd and following ventral segments narrowly testaceous at their apices and sparsely fringed with white hairs.

Length ♀ 10–11 mm.

The specimen from the Loangwa River, June 7, 1905, is marked as the type.

17. Mutilla dura, form n.

Rhodesia: Loangwa Valley, Petauké 1700 ft.: Dec. 25, 1905 (*S. A. Neave*).

♀. In general appearance size and markings very closely resembles *M. secreta*, the form just described. It can be distinguished as follows. Antennae: 2nd joint of the flagellum three times, not twice

as long as the 3rd ; thorax : broader posteriorly than anteriorly ; abdomen: basal joint slightly longer, its ventral carina *twice* incised; 3rd segment only with a pubescent interrupted white band above ; 4th segment entirely black; pygidial area flat, well defined and punctured, no tubercle on ventral valve of 6th segment.

Length ♀ 11 mm.

Described from a single specimen.

18. Mutilla iphianassa, form n.

Rhodesia: East Loangwa District, Petauké 2400 ft.: April 1, 1905 (*S. A. Neave*).

♀. Black ; mandibles at apex, the antennal tubercles and the thorax above a very dark obscure red, this colour on the thorax not extended to the anterior or posterior margins, but leaving an edging of black which is broadest on the median segment. Head and thorax above densely, the abdomen more sparsely clothed with erect brownish hairs; the abdomen with a thin scattered covering also of recumbent black hairs. Head closely and finely punctured, subquadrate slightly broader than long and slightly broader than the thorax anteriorly ; mandibles acute ; eyes ovate closer to the base of the mandibles below than to the occiput above ; antennae : scape shining with a few scattered brown hairs, flagellum opaque, basal two joints minutely but densely pubescent, 1st joint very short, 2nd twice as long as 3rd or 4th. Thorax nearly rectangular, coarsely cribrately punctured, very slightly broader posteriorly than anteriorly, arched in front, the sides dentate in the middle, behind which they are slightly emarginate, posteriorly the dorsal surface passes with an even but steep slope to the apex of the median segment; legs short, slender, tibiae of the intermediate and posterior pair of legs with a single row of spines, calcaria very slender, short and white. Abdomen : massive, sessile, finely punctured and shining ; 1st segment immaculate, ventral carina thick and deep, strongly incised in the middle ; 2nd segment with a triangular spot in the middle at base and a slender medially widely interrupted line of yellowish pubescence on its apical margin above ; 3rd segment with a broad similarly interrupted band of like pubescence above ; 6th segment shaded by a tuft of long yellowish hairs which hides the comparatively well-defined but small flat transversely striate pygidial area ; abdomen beneath covered rather densely with soft reddish-brown hairs.

Length ♀ 8–9 mm.

Described from a single example.

This form has a superficial resemblance to *M. alcyone*, Péringuey (suspected by Péringuey to be the ♀ of *M. exaltata*, Smith) in the red-colouring of the thorax which is confined to the dorsal face. In *alcyone*, however, the basal abdominal segment has an apical whitish patch, the 2nd segment a spot or ovate patch in the centre, and the 3rd and 4th segments similarly coloured bands. In addition, the shape of the head and the ventral carina on the basal abdominal segment are quite different.

19. Mutilla cristata, form n.

Rhodesia: Mashonaland, Salisbury 5000 ft.: Nov. 1903 (*G. Marshall*).

♂. Totally black and covered with a sparse clothing of erect white hairs which on the abdomen form slight but distinct fringes to the apical margins of the segments; on the legs the white hairs are rather more dense especially on the outside of the tibiae of the intermediate and posterior legs, the calcaria of which are also white; wings hyaline at base then gradually infuscate and on the forewings with a sharply marked broad terminal fuscous margin that has in certain lights a rich purple effulgence. Head broader than long, slightly broader than the thorax in front, vertex behind the ocelli raised into a blunt cone-shaped prominence, eyes oval deeply emarginate, head behind the eyes moderately developed; mandibles very broad towards the apex, tridentate; antennae moderately stout, 1st joint of the flagellum short, 2nd a little longer, 3rd slightly longer than the 2nd. Thorax moderately long more or less rectangular, prothorax sharply truncate in front, mesonotum short, convex; scutellum longer than broad rounded posteriorly; median segment roundly oblique and declivous; forewings with two well-marked cubital cells, the 3rd cubital cell faintly traced; legs slender the tibiae without spines. Abdomen long, the basal segment petiolate at base nodose at apex, the 2nd segment broadest in the middle, the others decreasing gradually to the 7th. Head and thorax closely and very coarsely punctured cribrate; median segment with six somewhat irregular longitudinal carina, the middle two of which do not extend to the apex, the intervals between the carina coarsely reticulate. Abdomen finely, closely and regularly punctured except on the node of the basal segment where the punctures are large and coarse, ventral carina of this segment very slight trifid towards the apex.

Length ♂ 12 mm. Exp. 20 mm.

Described from a single example.

This remarkable form has the appearance of a *Dasylabris*, but the emarginate eyes and tridentate mandibles do not allow of its being entered under that genus. The shape of the head and the multicarinated median segment serve to distinguish it from all African forms of *Mutilla* known to me.

20. Mutilla iphonoe, form n.

Natal (*Coll. W. W. Saunders*).

♀. Black, basal two-thirds of the mandibles, antennal tubercles, apex of scape, basal two joints of the flagellum of the antennae and the thorax dorsally and on the sides red. Head, thorax and abdomen covered with sparsely scattered erect yellowish hairs, the basal abdominal segment with an apical triangular patch in the middle above the 2nd, 3rd and 6th segments with dorsal, and the 2nd to the 6th segment with ventral bands or fringes of similar pubescence. Head subquadrate broader than long and a little broader than the thorax, very closely and somewhat coarsely punctured; mandibles somewhat obtuse at apex, antennal tubercles rounded, prominent; eyes placed rather forward equidistant from the occiput and the base of the mandibles, head well developed behind the eyes. Thorax rectangular not broader or narrower posteriorly than anteriorly above coarsely punctured the sides crenulate, the pronotum slightly arched in front; the median segment abruptly truncate, the posterior angles above well marked the margin with a row of five posteriorly-pointed long spines in the middle and two much shorter ones on each side at the angles. Abdomen more finely punctured than the thorax, basal segment short, with its ventral carina deep and incised in the middle, 1st to the 6th segment smooth along their bases, sparsely punctured along their posterior margins, the pygidial area well defined very firmly punctured.

Length ♀ 9 mm.

Described from a single example.

21. Mutilla lysippe, form n.

Rhodesia: Eastern Loangwa District, Petauké 2400 ft. ♀: Feb. 22, 1905 (*S. A. Neave*).

♀. Head, legs and abdomen black, thorax dark red. Head, thorax and abdomen covered with sparsely scattered erect black hairs, the abdomen in addition with close thick recumbent black pile, two small spots transversely on the 2nd segment above, a band on the 3rd segment above, long fringes on the 2nd to the 6th ventral

segment continued round the base of the latter above, of pale yellowish pubescence, the legs thickly studded with erect pale yellow hairs, the tibial calcaria pale yellow, the tibiae above with a double row of short reddish-brown spines. Head small, about as broad as the thorax closely punctured somewhat lenticular, three times as broad as long, the front faintly convex, the occiput arched; mandibles acutely pointed with a short blunt tooth on their inner margins, antennae opaque, antennal tubercles rounded, not prominent 2nd joint of the flagellum about a third longer than the 3rd or 4th joints; eyes large prominent, their lower orbits closer to the bases of the mandibles than their upper orbits to the occiput; head behind the eyes not much developed, rounded. Thorax from above rectangular dorsally longitudinally deeply carinate striate, the pronotum arched in front, the humeral angles rounded, median segment posteriorly vertically truncate, its posterior face vertically carinate, the apical margin above toothed, the teeth, which are continuations of the irregular longitudinal carinae covering the dorsal surface of the thorax, short. Abdomen massive above closely punctured, beneath: the bases of segments 2 to 6 very finely transversely striate, their apices punctured, ventral carina of basal segment very slightly raised twice incised, pygidial area well defined, slightly convex, longitudinally striate.

Length ♀ 11 mm.

Described from a single example.

22. Mutilla rufocoronata, form n.

Natal (*Coll. W. W. Saunders*).

♂. Black; the apical half of the mandibles, the tubercles and scape of the antennae and a broad transverse band on the posterior half of the head dark red, the thorax and legs brighter red. Head thorax and abdomen with sparsely scattered erect black hairs, the legs with shorter similar yellowish hairs; the apical margins of the 1st and 3rd abdominal segments each with a broad transverse band of golden pubescence, the apical margin of the 2nd segment with a narrow fringe of the same pubescence, beneath which the segment is bright testaceous red. Head rounded, not wider than the thorax, finely punctured; eyes large slightly convex, their upper orbits as far from the posterior angle of the occiput as their lower orbits from the base of the mandibles; mandibles acute at apex, simple; 2nd and 3rd joints of the antennae subequal. Thorax closely punctured, the punctures running into longitudinal striae, wider anteriorly than posteriorly, the apex roundly truncate; legs robust, the intermediate and posterior tibiae with a single row of short spines; the calcaria

white. Abdomen subsessile as long as the head and thorax united closely punctured above; ventral carina of basal segment well marked, truncate posteriorly; 6th segment convex without a pygidial area.

Length ♀ 7 mm.

Described from a single example.

23. Mutilla loangwana, form n.

Rhodesia: Loangwa District, Petauké 2400 ft.: April 1, 1905 (*S. A. Neave*).

♂. Black; the third and succeeding segments of the abdomen very dark ferruginous red; wings dark shining purple. Head not so wide as the thorax, not much developed behind the eyes; with somewhat sparse long black hairs on the vertex, front and underside; mandibles large and powerful, smooth and shining, armed with a small tooth medially on their edges, apex acute; clypeus slightly convex, smooth and shining, anteriorly widely emarginate; antennae comparatively short and stout, scape punctured and clothed with short hairs, flagellum with the 2nd, 3rd and 4th joints subequal; front above the antennae, vertex and sides of the head coarsely punctured, the sculpturing obscured by long hairs; ocelli not prominent; eyes rather small neatly triangularly emarginate on their inner orbits. Thorax broad and massive, very coarsely punctured and somewhat thickly covered with long black hairs; pronotum very short, posteriorly widely arched; mesonotum slightly convex, with six longitudinal carinae, none of which reach the anterior margin, the medial four in pairs with a deep groove between each pair; scutellum highly conical, divided by a deep smooth excavation from the mesonotum, median segment remarkably massive and broad, broader than long, very coarsely cribrate, apically truncate, two short longitudinal carinae from base down the middle ending in a loop before attaining the edge of the truncation; sides of the median segment sharply defined and carinate. Wings broad; forewing with three cubital cells; tegulae black, rounded, convex, covered with more or less arcuate or curved fine striae. Legs black; intermediate and posterior tibiae thickly clothed with long black hair. Abdomen: sessile, massive; basal segment more or less cupuliform, closely punctured, and distinctly subapically constricted by a broad but shallow sulcation, entirely clothed with long black hairs, beneath with a short straight highly raised wedge-shaped carina; second segment smooth shining, remotely and finely punctured above, beneath with large scattered punctures, fringed along upper

and under margin by stiff black hairs; remaining segments closely and finely punctured, more or less densely covered with long reddish hairs, that on the apical segment turn to black.

Length ♂ 21 mm. Exp. 46 mm.

Described from a single example.

Both in coloration and in sculpture unlike any African form known to me. It has, however, a distant resemblance to the males of the "*sexmaculata*" group of *mutilla* from India.

24. Mutilla cloantha, Péringuey.

Mutilla nigripennis, Sm. (nec. Oliv.), Cat. Hym. B.M., iii, 1855, p. 19.
Mutilla cloantha, Pér., Ann. S.A. Mus., i, 1898, p. 88.

Natal ♂ (*W. W. Saunders Coll.*)

25. Mutilla tettensis, Gerstaecker.

Mutilla tettensis, Gerst., Monats. Akad. Wiss. Berlin, 1857, p. 511; id. Peters, Reise n. Mozamb., v, 1862, p. 488 ♀, pl. 31, fig. 7; Sich. and Radosz., Hor. Soc. Ent. Ross., vi, 1869, p. 254; André, Wytsman's Gen. Ins. Hym., Fasc. 11, 1903, p. 38.

Natal ♀ (*W. W. Saunders Coll.*).

26. Dasylabroides idia, Péringuey.

Mutilla idia, Pér., Ann. S.A. Mus., i, pt. 2, 1897, p. 360 ♀.
Dasylabroides idia, André, Wytsman's Gen. Ins. Hym., 1903, p. 23.

Rhodesia: Mashonaland, Salisbury 5000 ft. ♀ (*G. A. K. Marshall*).

A single specimen that agrees well with Péringuey's description.

27. Dasylabroides inconspicua, Smith.

Mutilla inconspicua, Sm., Descr. New sp. Hym. B.M., 1879, p. 191 ♂ ♀.
Dasylabroides inconspicua, André, Wytsman's Gen. Ins. Hym., 1903, p. 23.

Natal ♂ (*Coll. W. W. Saunders*); Rhodesia: Melsetter, Gazaland 3600 ft. ♂ (*G. Marshall*).

28. Myrmilla africana, form n.

Natal (*Coll. W. W. Saunders*).

♂. Black and shining; the apices of the mandibles, the antennal tubercles, apex of the scape, 2nd joint of the flagellum of the antennae, the pro- and mesonotum, and scutellum brick red. Head, thorax, legs and abdomen covered with sparsely scattered erect white hairs. Head finely punctured broader than long and slightly broader than the thorax, mandibles acutely pointed, apical half longitudinally grooved, two preapical blunt teeth on the inner margin; antennae opaque, 2nd and 3rd joints of the flagellum subequal; eyes oval, entire, slightly convex. Thorax rounded in front, posteriorly roundly truncate, finely punctured, the median segment reticulate; wings flavo-hyaline, forewing with the stigma small, the radial cell short and wide, two complete cubital cells, the third cubital faintly traced, the 2nd recurrent nervure present, terminating well beyond the 2nd cubital cell; legs slender, tibial calcaria elongate. Abdomen nearly smooth, only very sparsely and finely punctured; 1st segment with the carina not much raised.

Length ♂ 6 mm. Exp. 11 mm.

Described from a single example.

Note.—The manuscript of this memoir gave the name *albicans* to the above species; but the specimen itself was distinctly labelled "*africana*, Bingham ♂, Type."—E. B. P.

29. Dolichomutilla vetustata, form n.

S. Rhodesia: Mt. Kapsuku, nr. Feira 3400 ft. ♀: May 20, 1904; and N.E. Rhodesia, East Loangwa Dist., Petauké 2400 ft. ♀♀: March 1 and 17, 1905 (*S. A. Neave*).

The specimen bearing the date March 17, 1905, is marked as the type.

♂. Jet black, the face in front somewhat sparsely clothed with long white hairs, the thorax with scattered erect black hairs the basal five abdominal segments fringed on their apical margins laterally with long white hairs; wings dark fuscous with a magnificent purple effulgence. Head, pro- and mesonotum, scutellum and postscutellum very densely and somewhat coarsely punctured; median segment reticulate, the reticulations large even and deep; abdomen closely but more finely punctured with the punctures shallower than on the thorax, on the middle of the segments above the punctures are sparse, the segments showing more or less of a smooth area, intermediate and posterior tibiae without spines. Head narrower

than the thorax, transverse, not much produced behind the eyes; mandibles broad, longitudinally grooved, with a preapical tooth on the inner edge; eyes convex, only slightly indented on the inner orbits, antennae stout, 2nd joint of flagellum half as long again as the 3rd; thorax slightly narrowed in front; scutellum raised into a conical large tubercle; median segment very oblique posteriorly slightly convex, sharply carinate on each side; abdomen subsessile, 1st segment short, its ventral carina well raised, its edge vertically sinuate.

Length ♂ 13–14 mm. Exp. 25–28 mm.

This form may be a variety of *D. atrata*, Linn., but the description of the latter speaks of a white transverse band on the abdomen, in the former the segments 1–5 are only laterally fringed with white.

30. Dolichomutilla guineensis, Fabr.

Mutilla guineensis, Fabr., Ent. Syst., ii, 1793, p. 367; Lep. Hym., iii, p. 640 ♀.

Rhodesia: East Loangwa, Petauké 2400 ft. ♀ (*S. A. Neave*).

A single ♀.

31. Dolichomutilla sycorax, Smith.

Mutilla sycorax, Sm., Cat. Hym. B.M., iii, 1855, p. 19 ♀.

Mutilla guineensis, Gerst. (nec. Fabr.), Monats. Akad. Wess. Berlin, 1857, p. 511 ♂; idem. Peters Reise n. Mozamb., Zool., v, 1862, p. 486, pl. 31, figs. 4 and 5 ♂ ♀; André, Zeits. Hym. Dipt., i, 1901, p. 339.

Natal ♀ (*Coll. W. Saunders*); Rhodesia: Mashonaland, Salisbury 5000 ft. ♀ (*G. Marshall*); Lagos ♀ (*J. A. Cremer*).

32. Dolichomutilla neavei, form n.

N.E. Rhodesia: East Loangwa District, Petauké 2400 ft. ♂: Dec. 28 and 31, 1904 (*S. A. Neave*).

The specimen captured Dec. 28, 1904, is marked as the type.

♂. Black and shining; the mandibles close to the apex, the pro- and mesonotum, scutellum and tegulae dark red; the head, thorax and abdomen covered with long erect black hairs; the mandibles beneath, the lower portion of the inner orbits, a fringe posteriorly on the scutellum and another posteriorly on the apical abdominal segment

covered with silky pale yellow hairs. There are besides many scattered whitish yellow erect hairs on the head posteriorly, on the sides of the median segment, on the basal segment of the abdomen, and on the apical three or four ventral segments. Abdomen above with two large rounded spots transversely on the 2nd segment and broad, medially broadly interrupted, bands of silky short white pubesence on the 3rd and 4th segments. Wings fuscous the terminal margins broadly and costa narrowly of the forewings darker fuscous. Head densely punctured, much broader than long, but much narrower than the thorax anteriorly, the face flat, slightly concave, not much developed behind the eyes, obliquely rounded. Mandibles and clypeus highly polished, smooth, the former acute at apex with a strong inner preapical tooth ; eyes elongate strongly emarginate on the inner side above ; antennae opaque, 2nd and 3rd joints subequal. Thorax massive anteriorly, the pro- and mesonotum and scutellum closely and coarsely punctured, the tegulae smooth and shining ; mesonotum with three longitudinal short carinae, the middle carina the longest, and a deep longitudinal groove on either side, these grooves not extended to the anterior margin of the mesonotum ; scutellum with a short longitudinal carina raised into a tubercle at apex ; median segment coarsely reticulate, the sides sharply carinate, the posterior face sloping to the apex ; wings : forewing with three cubital cells ; legs without spines. Abdomen subsessile, coarsely punctured, the 2nd segment with a central smooth unpunctured highly polished area.

Length ♂ 17 mm. Exp. 33 mm.

Resembles in colouring *Mutilla purpurata*, but the markings on the abdomen are quite different, and moreover it belongs to a different genus or subgenus.

33. Dasylabris nyctimene, Péringuey.

Mutilla nyctimene, Pér., Ann. S.A. Mus., i, 1898, p. 91 ♂.
Dasylabris nyctimene, André, Wytsman's Gen. Ins. Hym., Fasc. 11, 1903, p. 67.

Rhodesia : Mashonaland, Salisbury 5000 ft. ♂ (*G. Marshall.*)

34. Dasylabris mephitis, Smith.

Mutilla mephitis, Sm., Cat. Hym. B.M., iii, 1855, p. 21 ♀.
Dasylabris mephitis, André, Zeits. Hym. Dipt., 1901, p. 312 ♀.

Natal : Durban ♀ (*F. Muir*).

35. Dasylabris ate, form n.

Rhodesia: Mashonaland, Salisbury, May 1905 (*G. Marshall*).

♀. Black, the legs red; the head, thorax and abdomen closely punctured and covered with erect white hairs which are most prominent on the legs; the abdomen with transverse pubescent white bands on the apical margins of the 1st and 2nd segments, the latter band dilated in the middle, the 5th segment with a thick apical fringe of white hairs. Head broader than the thorax in front, longer than broad, occiput and cheeks behind the eyes rounded; mandibles acute at apex, antennae short, 2nd joint of flagellum much longer than the 1st and slightly longer than the 3rd, eyes oval convex, placed on the sides of the head, equidistant above and below from the lateral angle of the head and from the base of the mandibles. Thorax oval, broadest in the middle, sides convex, not excavate, punctured as above. Abdomen as long as the head and thorax united; basal segments petiolate and nodose at apex, ventral carina twice indented, 2nd segment very long and massive, pygidial area small and hidden by the fringe of white hairs at the apex of the 5th segment.

Length ♀ 6 mm.

Described from a single example.

This is the smallest form of the genus known to me.

36. Dasylabris inflata, André.

Mutilla (*Dasylabris*) *inflata*, André, Zeits. Hym. Dipt., i, 1901, p. 313.

Rhodesia: Gazaland and Upper Buzi River 3500 ft. ♀ (*G. Marshall*).

37. Stenomutilla capicola, Péringuey.

Mutilla capicola, Pér., Ann. S.A. Mus., i, 1898, p. 47 ♀ ♂.
Mutilla (*Stenomutilla*) *capicola*, André, Zeits. Hym. Dipt., i, 1901, p. 320 ♀ ♂.

Rhodesia: Mount Kapsaku 2400 ft. ♂ (*S. A. Neave*); Salisbury 5000 ft. ♂ (*G. Marshall*).

38. Stenomutilla clelia, Péringuey.

Mutilla clelia, Pér., Ann. S.A. Mus., i, 1899, p. 366 ♂.
Mutilla (*Stenomutilla*) *clelia*, André, Zeits. Hym. Dipt., i, 1901, p. 322 ♂.

N.E. Rhodesia: East Loangwa District, Petauké 2400 ft.: ♂ Feb. 21, 1905; ♀ Jan. 27, 1905 (*S. A. Neave*).

The ♂ specimen has the wings torn off. The ♀, so far as I know, has not been previously described.

♀. Black, the mesonotum of the thorax very obscurely dark red. Head, thorax and abdomen coarsely densely cribrately punctured and covered sparsely with stiff, erect, black hairs, the punctures on the 2nd abdominal segment are elongate and run into heavy, coarse, longitudinal striations, the clypeus, lower part of the face, the scape of the antennae and the legs have a more or less dense clothing of silvery white hairs mixed with the black; transverse bands at the apices of the 1st and 2nd abdominal segments of pale yellowish white pubescence. Head transverse, broader than long, and not so broad as the thorax in front; mandibles acute at apex, clypeus highly polished and shining; antennae stout, 2nd joint of the flagellum somewhat longer than the 3rd; eyes: convex, prominent, placed in the middle of the sides of the head equally distant from the base of the mandibles and from the posterior lateral angle of the head. Thorax short, of the same shape as in the ♂, transverse anteriorly, the sides parallel for a short distance then obliquely inclined towards each other, the apex truncate, the pleurae excavate, coarsely cribrate not smooth. Abdomen: basal segment petiolate, nodose at apex, the ventral carina not prominent, 2nd segment very long and massive, apical segment convex above, without a pygidial area.

Length ♀ 10 mm.

39. Stenomutilla beroe, Péringuey.

Mutilla beroe, Pér., Ann. S.A. Mus., i, 1898, p. 48 ♀.
Stenomutilla beroe, André, Wytsman's Gen. Ins. Hym., Fasc. 11, 1903, p. 68 ♀.

Natal: Lake Umkomaas ♂ (*G. Leigh*); Rhodesia: Mashonaland, Salisbury 5000 ft. ♂ ♀ (*G. Marshall*); East Loangwa, Petauké 2400 ft. (*S. A. Neave*).

♂. Black, the thorax red. Head, thorax and abdomen covered with erect black hairs, the base of the mandibles, the front of the scape of the antennae, the occiput, the median segment posteriorly, the legs and transverse bands on the apices of the basal three abdominal

segments with long whitish yellow hairs ; the black hairs along the apical margins of the 3rd to the 6th abdominal segments forming fringes and tufts; wings dark fuscous with a purple effulgence, head from above transverse, extended well behind the eyes, rounded and closely punctured all over ; mandibles broad at apex with a preapical inner tooth and a blunt tooth near the base on the outer edge. Clypeus smooth shining excavate, a strong carina between the bases of the antennae, eyes somewhat prominent, convex, the lower orbit closer to the base of the mandible than the upper orbit to the lateral posterior edge of the occiput, antennae slender, 2nd joint of the flagellum shorter than the 3rd, which is very slightly longer than the 4th. Thorax elongate oval, pro- and mesonotum and the pleurae, the scutellum and postscutellum coarsely punctured cribrate, tegulae of the wings small and smooth, median segment rounded reticulate, legs slender, punctured, intermediate and posterior tibiae with single rows of strong spines, basal joint of the posterior tarsi flattened, triangular ; wings ample, forewing with three cubital cells. Abdomen elongate, basal segment very long, petiolate, nodose at apex ; ventral carina simple not much raised extending about half the length of the segment from base, beyond it near the apical margin of segment there are two hollows or pits bounded and divided by slender short carina.

Length ♂ 16–19 mm. Exp. 28–32 mm.

Described from 7 ♂ examples.

40. Odontomutilla angulata, Smith.

Mutilla angulata, Sm., Descr. New sp. Hym. B.M., 1879, p. 190 ♂.
Mutilla horrida, Sm., Descr. New sp. Hym. B.M., 1879, p. 192 ♀.
Odontomutilla angulata, André, Zeits. Hym. Dipt., i, 1901, p. 335.
(*angulata* ♂, *horrida* ♀).

Natal ♀ (*W. W. Saunders Coll.*; *G. F. Leigh*; *F. N. Brown*); Rhodesia: Salisbury 5000 ft. ♀ (*G. Marshall*); East Loangwa, Petauké 2400 ft. ♀ (*S. A. Neave*).

I have provisionally placed a single ♀ from Petauké under *O. angulata* with much doubt. It is very much larger, more massive, looking at first sight very like a *Barymutilla*, but the head is not nearly so broad as the thorax in front, and the median segment is angulated posteriorly. In sculpture and markings it is practically

identical so far as can be seen (the specimen is much rubbed) with ♀ *O. angulata*. However, it is quite possibly distinct or perhaps it is the ♀ of the next form, *O. alienata*.

41. Odontomutilla alienata, form n.

Natal or O. R. Colony ♂ 1894–99 (*F. N. Brown*).

♂. Black, the pro- and mesonotum, the upper half of the pro- and mesopleurae, the scutellum and postscutellum red; the head, thorax legs and base and sides of the abdomen covered with short erect black hairs; the abdomen with a transverse broadly interrupted narrow pubescent white band on the apical margins of the 1st and 3rd segments; wings fuscous, tegulae yellowish red. Head not so broad as the thorax in front, transverse; mandibles acuminate at apex with a preapical blunt tooth on the inner margin, antennae stout, 1st and 2nd joints of the flagellum short subequal, 3rd joint much longer than the 2nd; eyes oval, deeply emarginate, head behind the eyes not much developed, rounded. Thorax short and broad, truncate anteriorly; scutellum broad flat, the lateral edges recurved, pointed, almost dentate posteriorly; median segment short and sloping with very large conical lateral projections, one on each side posteriorly; tegulae large, their apical edges recurved; forewings with two cubital cells and one recurrent nervure; legs stout with a double row of long spines on the intermediate and posterior tibiae. Abdomen sessile, about as long as the head and thorax united, basal segment short, its ventral carina deep, bi-indented. Head and thorax coarsely cribrately punctured, the punctures deeper and coarser on the mesonotum posteriorly and on the scutellum, median segment coarsely reticulate, the reticulations very wide; abdomen shining, coarsely punctured except on the middle and apical margins of the segments which are smooth and highly polished.
Length ♂ 13. Exp. 21 mm.

This form very closely resembles the ♂ of *O. angulata*, Smith, from which, however, it can be distinguished by the form of the median segment, which is much shorter than in *O. angulata*, the posteriorly produced lateral angles more massive and situated lower down; in *O. angulata* the pronotum is red only along the upper edge, in the present form it is red throughout; the wings in *angulata* are fusco-hyaline, in *alienata* very much darker with a purple effulgence.

Described from a single specimen of which the South African locality is unfortunately doubtful.

42. Odontomutilla rhua, form n.

Rhodesia: Mashonaland, Salisbury ♂: Nov. 1903 (*G. Marshall*).

♂. Head, thorax, basal and apical segments of the abdomen black, abdominal segments 2–6 ferruginous red; wings very dark fuscous with a purple effulgence. Head, thorax basal and apical two abdominal segments covered with erect black hairs, the legs and sparse irregular apical fringes, dorsally and ventrally to the 2nd, 3rd, 4th and 5th abdominal segments with snow-white hairs. Head narrower than the thorax in front, transverse, mandibles acute at apex with a blunt preapical tooth on the inner edge; antennae stout, 1st and 2nd joints of the flagellum short, the 2nd slightly the longer, 3rd and 4th subequal both much longer than the 2nd, eyes oval deeply emarginate, head behind the eyes moderately developed, the occiput not transverse posteriorly, bluntly angulated. Thorax short the pronotum truncate anteriorly, the mesonotum slightly convex, the scutellum transversely rectangular, truncate posteriorly; median segment short, obliquely and steeply sloped with lateral posteriorly conical projections or teeth; forewings with two cubital cells and one recurrent nervure; tegulae large oval; legs moderately stout intermediate and posterior tibiae without distinct spines. Abdomen sessile as long as the head and thorax united, basal segment very short, its ventral carina not much raised, dentate at base. Head and thorax coarsely cribrately punctured; median segment with broad reticulations; abdomen shining more finely and sparsely punctured.

Length ♂ 11 mm. Exp. 21 mm.

This form is unlike any *Odontomutilla* known to me, and has a coloration that is common in the males of many true Mutillas.

Described from a single example.

43. Odontomutilla erinnyis, Péringuey.

Mutilla crinnyis, Pér., Ann. S.A. Mus., i, 1898, p. 92 ♂.

Rhodesia: East Loangwa, Petauké 2400 ft. ♂ (*S. A. Neave*).

44. Odontomutilla notata, Lepeletur St. Fargeau.

Mutilla notata, Lepel., Hist. Nat. Hym., iii, 1845, p. 600; André, Wytsman's Gen. Ins. Hym., Fasc. 11, 1903, p. 27.

Cape of Good Hope ♀ (*Coll. W. W. Saunders*).

45. Barymutilla pythia, Smith.

Mutilla pythia, Sm., Cat. Hym. B.M., iii, 1855, p. 18 ♀.
Mutilla clelia, Pér., Ann. S.A. Mus., i, pt. 3, 1899, p. 443 ♀.
Mutilla cecilia, Pér., Ann. S.A. Mus., ii, pt. 5, 1901, p. 132 (*note*).
Barymutilla pythia, André, Zeits. Hym. Dipt., i, 1901, p. 335 ♂ ♀.

Rhodesia: East Loangwa, Petauké 2400 ft. ♀ (*S. A. Neave*).

46. Barymutilla cepheus, Smith.

Mutilla cepheus, Sm., Cat. Hym. B.M., iii, 1855, p. 18 ♀.
Barymutilla cepheus, André, Wytsman's Gen. Ins. Hym., Fasc. 11, 1903, p. 32.

Rhodesia: East Loangwa, Petauké 2400 ft. ♀ (*S. A. Neave*); *var.*, Manica, Mpudzi River 3000 ft. ♀ (*G. Marshall*).

The variety collected by Mr. Marshall is a larger, heavier insect, with the thorax a much brighter red, but the pubescent markings on the abdomen are identical with that of typical *cepheus*, Smith, and the shape of the head, thorax and abdomen and the sculpture are the same.

47. Barymutilla despicata, form n.

Rhodesia: Mashonaland, Umfuli River ♀: Nov. 1895 (*G. Marshall*), in the F. N. Brown Collection.

♀. Black, the thorax dark red; head thorax and abdomen with abundant erect black hairs; the clypeus shaded with yellow hairs; the front of the scape of the antennae, the head beneath, a fringe along the occiput, the pleurae of the thorax, the legs, the sides of the abdomen, posterior fringes to the ventral segments 2 to 5, and the pygidium clothed with silvery hairs; basal segment of the abdomen above with lateral quadrate spots on its posterior margin and a transverse band on the third segment, which is widely interrupted in the middle, of close set white pubescence. Head, thorax and abdomen coarsely, closely and deeply punctured, the punctures on the head and thorax forming short irregular carinae. Head not quite so wide as the thorax in front, transverse, produced behind the eyes; mandibles tridentate; antennal tubercles smooth, antennal hollows bounded above by sharp carinae that extend on each

side to the lower orbits of the eyes ; antennae stout, the 2nd joint of the flagellum a little longer than the 3rd, the 3rd and 4th subequal ; eyes oval situated midway between the lateral angles of the occiput and the base of the mandibles. Thorax truncate in front, the sides nearly parallel, slightly narrowed posteriorly, bluntly tuberculate in the middle, thorax posteriorly truncate ; legs stout, posterior tibiae with a single row of four or five long spines. Abdomen sessile, very massive, basal segment disciform, short, ventral carina short, bluntly dentate in the middle, 2nd segment long beneath, longitudinally but very shortly carinate ; pygidium convex.

Length ♀ 17 mm.

Described from a single example.

The females of different forms of *Barymutilla* are in many cases very like each other, the markings of the abdomen being very similar. The present form differs from ♀ *B. astarte*, Smith, and *B. pythia*, Smith, in the unmarked 2nd abdominal segment and in the form of the ventral carina of the 1st segment ; from *B. comparata*, Smith, by the latter character, by the narrower head and by the coarser puncturation.

48. Barymutilla comparata, Smith.

Mutilla comparata, Sm., Descr. New. sp. Hym. B.M., 1879, p. 191.

Barymutilla comparata, André, Wytsman's Gen. Ins. Hym., Fasc. 11, 1903, p. 32.

Natal ♀ (*W. W. Saunders Coll.*).

49. Barymutilla comparata, Smith, *var. affecta*, var. n.

Natal : Durban ♀ (*G. F. Leigh*) ; Rhodesia : Mashonaland, Salisbury 5000 ft. ♀ : Dec. 1902 (*G. Marshall*).

The example from Salisbury is marked as the type of the following description—

♀. In form and sculpture identical with *B. comparata*, Smith, differs only in that the 2nd abdominal segment is not unmarked but bears two parallel round pubescent white spots on its apical margin, one on each side of the middle, from each of which a short very slender line of similar pubescence extends outwards.

Length ♀ 12–14 mm.

Family SCOLIIDAE.

1. Scolia (Discolia) cyanea, Lepeletier.

Scolia cyanea, Lepel., Hist. Nat. Ins. Hym., iii, 1845, p. 525 ♂; Burm., Abh. naturf. Ges. Halle., i, pt. 4, 1853, p. 38 ♀ ♂; Bingh. A.M.N.H. (7), ix, 1902, p. 345. *Scolia* (*Discolia*) *cyanea*, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, p. 81 ♀ ♂.

Natal ♂ ♀ (*Coll. W. W. Saunders*); Durban ♂ (*G. F. Leigh*).

2. Scolia (Discolia) melanaria, Burmeister.

Scolia melanaria, Burm., Abh. naturf. Ges. Halle., i, pt. 4, 1853, p. 38 ♂; Gerst. Peters Reise n. Mozamb., Zool., v, 1862, p. 494 ♀ ♂; Bingh., A.M.N.H. (7), ix, 1902, p. 344.

Scolia (*Discolia*) *melanaria*, Sauss. and Sich., Spec. Gen. Scol., 1864, p. 82 ♀ ♂.

Discolia ruficornis, var. *melanaria*, Grib., Mem. Acad. Sci. Bolog. (3), iv, 1896, p. 47.

Gaboon ♂, Natal ♂ (*Coll. W. W. Saunders*); Rhodesia: East Loangwa, Petauké 2400 feet ♀ ♂ (*S. A. Neave*).

3. Scolia (Discolia) ruficornis, Fabricius.

Scolia ruficornis, Fabr., Ent. Syst., ii, 1793, p. 230; Gerst. v. d. Deck, Reise in Ost. Afr., 1873, p. 334 ♀ ♂; Bingh. A.M.N.H. (7), ix, 1902, p. 244. *Scolia* (*Discolia*) *ruficornis*, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, p. 85 ♀ ♂.

Without locality, but probably Natal ♂ ♀ (*Coll W. W. Saunders*); Rhodesia: East Loangwa, Petauké 2400 ft. ♂ (*S. A. Neave*).

One pair ♂ and ♀ from the Saunders collection have the flagellum of the antennae (except the basal joint) bright yellow, not red, and the ♀ of this pair has the front of the head dusky red. It is quite possibly distinct, but then they are both without locality.

4. Scolia (Discolia) terminalis, Saussure.

Scolia (*Discolia*) *terminalis*, Sauss., Ann. Soc. Ent. Fr. (3), vi, 1858, p. 207 ♀ ♂; id. and Sich., Spec. Gen. Scol., 1864, p. 95.

Cape of Good Hope ♂ (*Coll. W. W. Saunders*); Rhodesia: Hill near Fort James 4–5000 ft. ♀ (*S. A. Neave*).

Bears a very close resemblance to the Oriental *Liacos* (*Triliacos*) *analis*, Fabr., but is a true *Scolia* with only one discoidal cell.

5. Scolia (Discolia) senex, Smith.

Scolia senex, Sm., Cat. Hym. B.M., iii, 1855, p. 94 ♂.
Scolia (*Discolia*) *senex*, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, p. 98 ♀ ♂.

Cape of Good Hope ♂ (*Coll. W. W. Saunders*); Natal: Estcourt ♀ (*G. Marshall*).

A single ♂ specimen which I believe to be the type, as the insect was originally described from the Saunders collection and there is no other ♂ specimen of the form in the collection of the British Museum that dates back to Smith's day.

6. Scolia (Discolia) chrysotricha, Burmeister.

Scolia chrysotricha, Burm., Abh. naturf. Ges. Halle., i, pt. 4, 1853, p. 32 ♀; Bingh., A.M.N.H. (7), ix, 1902, p. 345.
Scolia (*Discolia*) *chrysotricha*, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, p. 98 ♀ p.

Without locality, but probably Natal ♂ ♀ (*Coll. W. W. Saunders*). One specimen, a ♂, has the wings particularly dark, almost fuscous, the yellow confined to a very narrow strip along the basal two-thirds of the costa of the fore-wing.

7. Scolia (Discolia), dispar, Klug.

Scolia dispar, Klug, Symb. Phys., Dec. 3, 1832, Ins., pl. 26, fig. 1 ♀, fig. 2 ♂; Burtn., Abh. Naturf. Ges. Halle., i, pt. 4, 1853, p. 34 ♀ ♂; Bingh., A.M.N.H. (7), ix, 1902, p. 345.
Scolia (*Discolia*) *dispar*, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, p. 76 ♀ ♂.
Scolia lateralis, Klug, Symb. Phys., Dec. 3, 1832. Ins., pl. 26, fig. 3 ♀, fig. 4 ♂, *var.*

Arabia ♀ ♂ and *var. lateralis* Dongola ♂ ♀ (*Coll. W. W. Saunders*).

8. Scolia (Discolia) alaris, Saussure.

Scolia alaris, Sauss., Ann. Soc. Ent. Fr. (3), vi, 1858, p. 203, ♀ ♂; Bingh., A.M.N.H. (7), ix, 1902, p. 344.
Scolia (Discolia) alaris, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, figs. 97 and 282 ♀ ♂.

Without locality, but probably Natal; ♂ *not typical* (*Coll. W. W. Saunders*).

9. Scolia (Discolia) micromelas, Sichel.

Scolia (Discolia) micromelas, Sich., Sauss. and Sich ; Cat. Spec. Gen. Scol., 1864, p. 82 ♂.

Rhodesia: Mashonaland, Salisbury 5000 ft. ♂ (*G. Marshall*); East Loangwa, Mbala country (*S. A. Neave*).

10. Scolia (Discolia) megaera, Saussure.

Lacosi megaera, Sauss., Stett. Ent. Zeit., xx, 1859, p. 180 ♀.
Scolia (Discolia) megaera, Sauss. and Sich., Cat. Spec. Gen. Scol., 1884, p. 90 ♀.

Natal ♀ (*Coll. W. W. Saunders*) ; near Durban ♀ (*G. F. Leigh*).

The specimen from the Saunders collection is in bad condition, and I am doubtful whether I have identified it correctly.

11. Scolia (Discolia), meridionalis, Saussure.

Lacosi meridionalis, Sauss., Stett. Ent. Zeit., xx, 1859, p. 182 ♀.
Scolia (Discolia) meridionalis, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, p. 92 ♀.

Natal: S. of Durban ♂ (*G. F. Leigh*).

The specimen, which I identify as the ♂ of the above form, differs from Saussure's description of the ♀ as follows. Head black, not obscure rufo-ferruginous, the emargination of the eyes in front and a line behind them reddish ferruginous, the sides and apical margin of the clypeus also similarly stained. Otherwise in sculpture and pubescence it is identical with *meridionalis* as described by Saussure.

12. Liacos (Triliacos) nigrita, Fabricius.

Scolia nigrita, Fabr., Spec. Ins., i, 1781, p. 452 ♀.
Scolia (*Liacos*) *nigrita*, Sm., Cat. Hym. B.M., iii, 1855, p. 114 ♀.
Liacos (*Triliacos*) *nigrita*, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, p. 35 ♀ ♂.
Liacos nigrita, Sauss., Grandid. Hist. Madagasc., xx, pt. 1, 1892, p. 227, pl. 5, figs. 11 and 12 ♀ ♂.

Natal ♀ (*Coll. W. W. Saunders*); Rhodesia: Melsetter, Gazaland ♂ (*G. Marshall*), Natal ♂ (*G. F. Leigh*).

13. Elis (Dielis) dimidiatipennis, Saussure.

Elis dimidiatipennis, Sauss., Mem. Soc. Phys. and Hist. nat. Genève, xiv, pt. 1, 1854 (Mel. Hym.), p. 64 ♀.
Scolia fenestrata, Sm., Cat. Hym. B.M., iii, 1855, p. 104 ♀.
Elis (*Dielis*) *dimidiatipennis*, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, p. 168.

Rhodesia: Mashonaland, Salisbury 5000 ft. (*G. Marshall*).

14. Elis (Dielis) signata, Smith.

Scolia signata, Sm., Cat. Hym. B.M., iii, 1855, p. 105 ♀.
Elis (*Dielis*) *signata*, Sauss. and Sich., Cat. Sp. Gen. Scol., 1864, p. 176 ♀.

Rhodesia: East Loangwa, Petauké 2400 ft. 2 ♀ 6 ♂ (*S. A. Neave*); also 1 ♂ 1 ♀ from other Rhodesian localities and 2 ♂ 1 ♀ Salisbury (*G. Marshall*). The author's name is on a ♂ from Salisbury (1895), which is regarded as the type of the following description.

The ♂, which has not before been described closely, resembles the ♀, but the head and thorax are densely clothed with short hoary yellowish pubescence that hides the sculpture, the wings are hyaline with only the very faintest tinge of yellow, and the transverse yellow bands on the segments of the abdomen above are very broad and deeply excavated on each side. In the ♀ these bands are only slightly laterally excavate.

15. Elis (Dielis) collaris, Fabricius.

Tiphia collaris, Fabr., Syst. Ent., 1775, p. 354.
Scolia thoracica, Fabr., Mant. Ins., i, 1787, p. 281 (nec. *Tiphia thoracica*, Fabr., Ent. Syst., Suppl., 1798, p. 254).

Scolia senilis, Fabr., Ent. Syst., ii, 1793, p. 237.
Scolia hirticollis, Fabr., Syst. Piez., 1804, p. 243.
Scolia vestita, Klug, Symb. Phys., 1832, Ins., pl. 27, fig. 6 ♀.
Scolia discolor, Klug, *l. c.*, Ins., pl. 27, fig. 7.
Campsomeris ruficollis, Lepel., Hist. Nat. Ins. Hym., iii, 1845, p. 500.
Elis canescens, Sauss., Mem. Soc. Phys. and Hist. Nat. Genève, xiv, pt. 1, 1854 (Mel. Hym. i), p. 55.
Elis (*Dielis*) *collaris*, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, pp. 163 and 295 ♀ ♂.

Egypt ♀ (*Coll. W. W. Saunders*).

16. Elis (Dielis) albicollis, Christ.

Sphex albicollis, Christ, Naturg. d. Ins., 1791, p. 260, pl. 26, fig. 1 ♀.
Sphex flavirons, Christ, *l. c.*, p. 261, pl. 26, fig. 3 ♀.
Tiphia thoracica, Fabr., Ent. Syst., Suppl., 1798, p. 254.
Campsomeris aureicollis, Lepel., Hist. Nat. Ins. Hym., iii, 1845, p. 499.
Scolia eriophora, Klug, Symb. Phys., 1832, pl. 27, fig. 5 ♂.
Elis (*Dielis*) *coelebs*, Sichel, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, p. 184.
Elis (*Dielis*) *thoracica*, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, p. 188.
Elis thoracica var. coelebs, Sauss., Grandidier's Hist. Madagasc., xx, pt. i, 1892, p. 223.
Scolia abicollis, Dalla Torre, Cat. Hym., viii, 1897, p. 145.
Elis albicollis, Bingh., A.M.N.H. (7), ix, 1902, p. 346.

Natal ♀ ♂ (*Coll. W. W. Saunders*); Rhodesia: Salisbury 5000 ft. ♀ (*G. Marshall*); East Loangwa, Petauké 4500 ft. ♀ ♂ (*S. A. Neave*).

A very puzzling form of which *E. eriophora*, Klug, is said by Dalla Torre to be the ♂.

17. Elis (Dielis) xanthura, Saussure.

Elis (*Campsomeris*) *xanthura*, Sauss., Ann. Soc. Ent. Fr., 1858, p. 225 ♀.
Elis (*Dielis*) *xanthura*, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, p. 169 ♀.

Rhodesia: East Loangwa 2500 ft., Petauké ♀ (*S. A. Neave*).

18. Elis (Dielis) fasciatella, Klug.

Scolia fasciatella, Klug, Symb. Phys., 1832, Ins., pl. 27, fig. 8 ♂; Smith, Cat. Hym. B.M., iii, 1855, p. 103.
Elis (*Dielis*) *fasciatella*, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, p. 170.

Rhodesia: Mashonaland, Salisbury 5000 ft. ♂ (*G. Marshall*); East Loangwa, Petauké 2400 ft. ♂ (*S. A. Neave*).

The ♀ of this form is still unknown. It may, however, be *Elis* (*Dielis*) *aureola*, Klug, and the males may be dimorphic.

19. Elis (Dielis) godefredi, Sichel.

Elis (*Campsomeris*) *godefredi*, Sich., Ann. Soc. Ent. Fr., 1858, p. 227 ♂.
Elis (*Dielis*) *godefredi*, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, p. 177 ♂.

Natal ♂ (*G. F. Leigh*); Rhodesia: Mashonaland, Salisbury 5000 ft. ♂ (*G. Marshall*); East Loangwa, Petauké 2400 ft. ♂ (*S. A. Neave*).

20. Elis (Dielis) lachesis, Saussure.

Elis (*Campsomeris*) *lachesis*, Sauss., Stett. Ent. Zeit., xx, 1859, p. 262 ♀.
Elis (*Dielis*) *lachesis*, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, p. 182, pl. 2, fig. 16 ♀.

Natal ♀ (*G. Marshall*); Rhodesia: Mashonaland, Salisbury 5000 ft. ♂ (*G. Marshall*); East Loangwa, Petauké 4500 ft. ♀; and Melsetter, Gazaland ♀ (*S. A. Neave*).

The ♂ which I believe to be the ♂ of this form very closely resembles the ♂ of *E. albicollis*, but it is a smaller slighter insect with the head and thorax more sparsely pubescent, and the apical margin of the 1st as well as those of the 2nd to 5th abdominal segments with a transverse reddish yellow band.

21. Elis (Dielis) clotho, Saussure.

Elis (*Campsomeris*) *clotho*, Sauss., Stett. Ent. Zeit., xx, 1859, p. 263 ♀.

Elis (*Diclis*) *clotho*, Sauss. and Sich., Cat. Gen. Spec. Scol., 1864, p. 182 ♀.

NATAL: Durban ♂: Jan. 18, 1906 (*G. F. Leigh*); RHODESIA: Mashonaland, Salisbury ♀ (*G. Marshall*); Melsetter, Gazaland ♀ (*S. A. Neave*).

It is with considerable hesitation that I assign the single ♂ specimen from Durban in Natal to the above form. If it is not the ♂ of *E. clotho*, but previously undescribed, it may stand as *E. leighi* mihi.

♂. Black with an iridescent blue sheen on the abdomen; head, thorax and abdomen covered all over with a more or less sparsely set clothing of soft erect cinereous hairs, tibial calcaria of the posterior pair of legs white, anal spines black; the base of the mandibles, upwardly convergent short stripes on the sides of the clypeus, the posterior margin of the pronotum, lateral transverse short lines one on each side on the scutellum, a medial short similar line on the postscutellum, and the apical margins of the 2nd, 3rd and 4th abdominal segments pale dull yellow; of the last-mentioned markings that on the 2nd segment is deeply, on the 3rd slightly emarginate laterally, the marking on the 4th segment is a simple transverse even band. Head, pro- and mesonotum, scutellum, postscutellum and abdomen above with sparsely scattered fine and very shallow punctures; median segment regularly and more closely punctured above, smooth and impunctate on its posterior face. Head flat, not as broad as the thorax; mandibles acute at apex, clypeus strongly convex, face in front raised, tuberculous between the antennae; these latter filiform opaque, eyes deeply emarginate above on their inner margins, ocelli prominent. Thorax oval; median segment truncate and concave posteriorly; wings fusco-hyaline with a bronzy, in some lights a purplish effulgence, forewing with two cubital cells and two recurrent nervures, legs slender unarmed. Abdomen: elongate slender, basal segment subpetiolate, nodose towards apex, a strong constriction between it and the 2nd segment, both above and below.

Length ♂ 17. Exp. 28 mm.

The above-described ♂ resembles more or less the males of *E. villosa*, *fasciatella* and *godefredi*, but can be distinguished from these three forms by the paucity and narrowness of the yellow markings on the abdomen, by the darker colour of the wings, and by the shape of the median segment which has its posterior face much more deeply concave.

22. Elis (Dielis) fasciatipennis, Smith.

Scolia fasciatipennis, Sm., Cat. Hym. B.M., iii, 1855, p. 103 ♀♂.

Elis (*Dielis*) *fasciatipennis*, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, p. 169 ♀♂; Kirby, Trans. Ent. Soc., 1889, p. 448 ♀♂.

Rhodesia: Mashonaland, Salisbury 5000 ft. ♀ (*G. Marshall*).

23. Elis (Dielis) aureola, Klug.

Scolia aureola, Klug, Symb. Phys., 1832, pl. 27, fig. 11 ♀.

Colpa dimidiata, Lepel., Hist. Nat. Ins. Hym., iii, 1845, p. 549 ♀.

Elis (*Dielis*) *aureola*, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, p. 173 ♀.

Natal: Durban ♀ (*G. F. Leigh*); Rhodesia: East Loangwa, Petauké 4500 ft. ♀ (*S. A. Neave*).

24. Elis (Dielis) felina, Saussure.

Elis (*Campsomeris*) *felina*, Sauss., Stett. Ent. Zeit., xx, 1859, p. 265 ♀♂.

Elis (*Dielis*) *felina*, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, p. 175 ♀♂.

Natal: Durban ♀ (*G. F. Leigh*); Rhodesia: Mashonaland, Salisbury 5000 ft. ♂ (*G. Marshall*).

Saussure, when describing *E. felina*, remarked that it was possibly a variety only of *E. aureola*, Klug. This I think very likely, the only structural differences between *Elis aureola* and *Elis felina* are that the former insect has the head above highly polished, smooth and shining, the thorax above also smooth with only one or two punctures; *Elis felina*, on the contrary, has the head and thorax above closely punctured, dull and opaque. The males assigned by me to the latter form agree very closely with Saussure's brief description.

25. Elis (Dielis) quinquefasciata, Fabricius.

Scolia quinquefasciata, Fabr., Spec. Ins., i, 1781, p. 453.

Elis (*Dielis*) *quinquefasciata*, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, p. 177 ♂.

RHODESIA: Mashonaland, Salisbury 5000 ft. ♂ (*G. Marshall*); East Loangwa, Petauké 2400 ft. (*S. A. Neave*).

The males of two forms, probably new, are also contained in the collection; but as they are represented each by only one specimen, and these not in the best condition, I have failed to identify them and do not like to describe them as new.

26. ELIS (TRIELIS) PARDALINA, Gerstaecker.

Scolia pardalina, Gerst., Monats. Acad. Berlin, Nov. 1857; id. Mém. Acad. Berl., 1858, p. 495, pl. 31, fig. 11 ♂.
Elis (*Trielis*) *pardalina*, Sauss. and Sich., Cat. Spec. Gen. Scol., 1864, p. 148 ♂.

PORT EREL* ♀ (*Coll. W. W. Saunders*). ZAMBEZI ♂ (*S. A. Neave*).

The ♀, of which there is a single specimen only, very closely resembles *Elis* (*Dielis*) *clotho*, Sauss., but the wings are hyaline with a fuscous subapical cloud on the forewing, and that wing has also three cubital cells and two recurrent nervures.

27. MYZINE RUFONIGRA, form n.

RHODESIA: Bulawayo: Sept. 9, 1905 (*F. A. Dixey*).

♂. Dull black, covered with long, soft, somewhat woolly, white hairs which are most dense on the front of the head and on the thorax posteriorly; the mandibles, clypeus, a spot above the base of the antennae, transverse medially interrupted narrow bands on the anterior and posterior margins of the pronotum, the tegulae, the tibiae and tarsi above, the femora beneath, and transverse narrow bands on the 3rd–6th abdominal segments above pale somewhat greenish yellow; the yellow on the tibiae and tarsi of the anterior and intermediate legs is continued on the underside and the transverse yellow bands on the abdominal segments are each anteriorly emarginate laterally; basal two abdominal segments blood red. Wings hyaline. Head, thorax and abdomen minutely and somewhat sparsely punctured, the median segment posteriorly, and the

* "Port Erel" was Col. Bingham's reading of W. W. Saunders' handwriting on the label. It seems to me more like "Port Wel," a possible contraction of "Port Welcome"; but my friend Prof. A. J. Herbertson has not been able to find that either is known to geographical science.—E. B. P.

basal abdominal segment above smooth, polished and shining, anal up-curved spine black and shining.

Length ♂ 14. Exp. 20 mm.

Described from a single example.

Family POMPILIDAE.

1. Pompilus viaticus, Linn., var. nigripennis, Tournier.

Sphex viatica, Linn., Syst. Nat., Ed. 10, i, 1758, p. 570; Fabr., Syst. Ent., 1775, p. 349.

Pompilus viaticus, Fabr., Ent. Syst., Suppl., 1798, p. 246, et Auct.

Pompilus viaticus, var. nigripennis, Tournier, l'Entomologiste Génevois, 1889, p. 198.

Rhodesia: Loangwa 1700 ft. ♀ (*S. A. Neave*).

This form of the common *P. viaticus*, Linn., seems to be more or less widely spread in Africa. Tournier records it from Tangier and Morocco, and there is a ♂ in the collection of the British Museum from West Africa.

2. Pompilus natalicolus, Dalla Torre.

Pompilus natalicolus, Dalla Torre, Cat. Hym., viii, 1897, p. 304.

Pompilus fervidus, Smith, Descr. New sp. Hym. B.M., 1879, p. 145 (nec. Smith, 1873).

Natal: Estcourt 4000–5000 ft. ♀ (*G. Marshall*).

3. Pompilus festivus, Klug.

Pompilus festivus, Klug, Symb. Phys., 1834, pl. 38, fig. 8 ♂.

Natal: Estcourt 4000–5000 ft. ♂ ♀ (*G. Marshall*); Rhodesia: Mashonaland, Salisbury 5000 ft. ♂ (*G. Marshall*).

Described first from Arabia.

4. Pompilus jacens, form n.

Rhodesia: Mashonaland, Salisbury 5000 ft.; Oct. 1899 (*G. Marshall*).

♀. Black; the palpi, mandibles, labrum, clypeus, sides of the face, a line along the inner and outer orbits meeting on the vertex, the antennae, the sides of the mesonotum broadly, the tegulae, the

apices of the coxae, the trochanters, femora, tibiae, and tarsi orange red, a broad transverse yellow band on the posterior margin of the pronotum spreading on to the anterior margin of the mesonotum in the middle, an elongate stain on the posterior tibiae and the anterior and intermediate tarsi also more or less washed with pale yellow, apical segment of abdomen above white; wings hyaline forewing fuscous at apex, veins testaceous. Head as broad as the thorax convex in front remarkably flat posteriorly, in appearance like the half of a pea; mandibles bidentate at apex, labrum triangular, clypeus anteriorly arched, raised in the middle by a strong transverse carina, that has a sharp vertical carina impinging on it in the middle, the latter carina is continued upwards between the base of the antennae to the forehead; ocelli in a triangle on the vertex, antennae comparatively short, robust, moniliform, eyes large, their inner margins parallel. Thorax very long, a third as long again as the abdomen; pronotum rounded anteriorly and at the shoulder, its posterior margin arched; mesonotum very slightly convex, scutellum elongate triangular and laterally strongly compressed, median segment evenly rounded posteriorly and obliquely sloped, a broad very ill-defined longitudinal furrow to apex; wings: forewing the radial cell large pointed at apex, the medial and submedial cells of the same length, the basal and 1st transverse subbasal nervures therefore interstitial, 1st cubital cell about as long as the 2nd and 3rd united, 2nd cubital cell quadrate receiving the 1st recurrent nervure about three-fourths of its length from base, 3rd cubital cell trapezoidal, measured along the cubital nervure below it is about twice the width it is at top; hindwing the cubital nervure originates before the apex of the submedial or anal cell, the cubital nervure at origin therefore not interstitial with the transverse anal nervure. Legs short, stout, cylindrical, spines large and stout, intermediate inner tibial calcar four-fifths, posterior inner tibial calcar three-fourths as long as their respective metatarsi, claws of fore tarsi bifid, of intermediate and posterior tarsi toothed beneath. Abdomen short and stout. Head, thorax and abdomen dull and opaque covered somewhat sparsely with short erect pale hairs, these are white and silvery at the apex of the median segment and are there longer and denser.

Length ♀ 9. Exp. 21 mm.

Described from a single example.

5. Pompilus vindicatus, Smith.

Pompilus vindicatus, Sm., Cat. Hym. B.M., iii, 1855, p. 142 ♀.

Natal ♀ (*Coll. W. W. Saunders*); Rhodesia: Mashonaland, Salisbury 5000 ft. ♀ (*G. Marshall*).

6. Pompilus iridipennis, Smith.

Pompilus iridipennis, Sm., Desc. New sp. Hym., 1879, p. 144 ♀.

Natal ♀ ♀ (*Coll. W. W. Saunders*).

This form, which is not to be confounded with *Pompilus* (*recte Salius*) *iridipennis*, Smith (Jour. Linn. Soc., 1858, p. 98), is very closely allied to *P. vindicatus*, Smith, differing from it in the broader and longer median segment which is also more rounded above. In *P. vindicatus*, the median segment is laterally compressed so as to form a slight longitudinal hollow on each side above.

XXIV. *A Contribution to the Life History of* Hesperia sidae, *Esp.* By Harold Powell, F.E.S.

[Read May 3rd, 1911.]

Plate XLVII.

This is a very local skipper, and is never abundant even where it occurs. It is found in moist parts (not marshy) of certain valleys in S.E. France as well as in Italy, eastern Europe, and Asia. I have come across it in several places in the Dept. Var, both on limestone and schistous ground.

In the commune of Hyères it occurs in the Vallon de la Monière, where it is very scarce now, and in the valley of the Plan du Pont, where it is more abundant, though in the height of its season a bag of ten or fifteen specimens in one day is a very good one. In the Hyères district it flies from the end of April to about the 20th of May.

For many years I had been hoping to find out something about its life history, which, I believe, is so far unknown, but it was not until 1909 that I got an opportunity to spend some time in its locality at a time when the imagines were flying.

On May 5 of that year I went over the hills to the Plan du Pont valley with the intention of getting the egg and discovering the food-plant if possible. On this day I found *sidae* well out, nine of the eleven specimens taken being quite fresh, one ♂ and one ♀ having their wings still weak and hardly dry. It is decidedly local in its habit, keeping pretty closely to certain parts of the valley, and never straying to the hillsides enclosing it.

As the family *Rosaceae* furnishes food-plants for most of the species of the genus, I first looked round to see what Rosaceous plants were growing in *sidae's* special haunts.

Two species of *Rubus* were common, also *Poterium sanguisorba* and, more locally, *Potentilla hirta*, L. I saw

Hesperia sao ovipositing freely on the flower heads of *Poterium*, but, although I watched three ♀♀ of *H. sidae* for as long as it was possible to keep them in sight, they made no attempt to lay eggs. They were probably too fresh and had perhaps not mated.

Their flight is very rapid and erratic, and they were easily lost sight of. One may be seen coming up the path between the narrow strips of prairie, in its rapid, jerky way, and it may perhaps settle, but when approached it is off again with a whirr of wings distinctly heard, and is quickly lost in one of its long zigzags. If one stays in the same place it will very probably be seen returning after a while, for *sidae* does not wander far from its "run."

However, if I did not see the skipper in the act of egg-laying on that day, I got as far as the fact that it only flew where the *Potentilla hirta* grew, and that plant, as I have already said, was local, though it grew abundantly enough in patches. I found only two or three plants in flower, though it was evident that in a day or two it would be flowering generally.

I did not return to the valley until May 14. In the meantime the weather had been mostly fine and warm, but the 10th, 12th, and 13th were wet. The *Potentilla* was then flowering well, and there were as many *sidae* about as on the previous occasion. I again took two freshly emerged specimens, but most showed signs of wear. I recognised a crippled specimen which I had seen on May 5. Although the yellow bands of the hindwings beneath had faded, its fringes and general appearance above were still good.

Soon after reaching the ground, I saw a ♀ seemingly feeding on a *Potentilla* flower, but she went off at once across the stream. I kept her in sight, and she soon returned to the *Potentilla* patch, settling on a flower on which I supposed she meant to feed, but I saw her, with wings still open, curve her abdomen until the extremity touched the flower. She kept it there for a few seconds and then flew off again. Picking the flower, I found an egg amongst the stigmata, nearly in the centre. I saw another egg laid in the same way, and then I lost sight of the ♀. Having got so far, the rest was easy. I set to work to examine the flowers, and soon found a number of eggs. On three occasions I found two eggs on one flower, but the usual habit

seems to be one egg only; and at any rate not more than one egg is laid at a "sitting."

Some of the flowers were over, the petals had fallen and the calices had closed up over the centres. On pulling these open I often found eggs inside. Most of the flowers were overrun with small beetles of several kinds and Thrips species, but these did not seem to interfere with the eggs.

A little after 2 p.m. I saw another ♀ *sidae* busy on an isolated patch of *Potentilla*. She left when I came near, and, on carefully examining the flowers of this patch, I found no eggs, with the exception of two on a head closed up by the calyx. These had evidently been laid before her time by some earlier ♀. However, whilst I was still searching, she returned, and I had the satisfaction of seeing her settle on the stem of a plant and lay an egg on the underside of a leaf nearly half-way between the flower head and the ground. This particular ♀ had no doubt laid most (if not all) her eggs in this way, which would account for my finding none on the expanded flowers of the patch.

The flower seems to be preferred as a resting-place for the egg. I found forty-five laid on the stigmata, one on the underside of a leaf, and, on examining a stock of plants I brought home, two more were found on the calyces of unopened flowers. Males are generally to be met with along a rather wide path running down the valley in which the *Potentilla hirta* grows. They apparently divide this path into sections, each male keeping pretty much to his section, up and down which he flies, or rests with expanded wings on a bush or flower on the narrow strips of prairie bordering the path.

Should another male venture upon his section he will attack him, and a very rapid chase follows. It is almost impossible to keep the skippers in sight during such a chase.

He will also attack any other skipper that may come by, or almost any fast flying butterfly, in fact, but in these cases the chase is soon abandoned.

The pursuit of a ♀ of his species is equally rapid, and may take him further away. The ♀ ♀ are more often seen in the fields overgrown with wild stuff than on the path.

Ovum :

Shape.—Squat, greatest horizontal diameter at a point nearer the base than the top. The base is broad, rounded off, and with a shallow central depression. The upper portion of a flattened dome shape ; micropylar cup fairly broad but not very deep. Height, ·7 mm.; greatest width, ·6 mm.

Sculpturing.—About 21 main ribs start from near the base and run up rather irregularly towards the rim of the micropylar cup, but sometimes two will join together on the way up, so that fewer reach the rim than left the base. Some do not go beyond the junction. These ribs sink and disappear before the base is reached. Base fairly smooth. Between the main ribs are the usual smaller transverse ribs, forming oblong, irregular cells. They also diminish in height towards the base. In the centre of the micropylar cup is a rosette of very small cells, which appears to be slightly raised. The ribs are not sharp-edged, and though very distinct, are not high.

Colour and Surface Appearance.—When first laid they are almost pure white. The next day they are very pale creamy white and pearly. Some found which had certainly been laid several days before, did not differ much from eggs just laid. On May 17th I found that all the eggs had turned a pale orange yellow, and that those on the flowers were more difficult to see in consequence. They were generally well sprinkled with pollen.

On May 19th the orange-yellow colour was rather deeper. The colour did not deepen after this, but about a day before hatching the black head of the larva, showing through the eggshell, formed a large, dark leaden patch at the top.

An egg which I saw laid on May 14, hatched between the afternoon of May 22 and the morning of the 23rd. Most of the other eggs hatched on the 23rd, which makes it probable that few of them could have been very long laid when I found them on the 14th.

The larva eats a large circular piece out of the top of the egg, but after emerging it does not finish up the egg-shell. It is active and restless, spinning silk as it moves about. One under observation has settled down on a division of one of the upper leaves, and is drawing the edges together with silk. The green tinge of the body of another specimen shows that it has already fed.

First stage.—The colour of the body is straw yellow before the young larva has taken its first food. I made some notes on May 30th on a specimen which was then resting for the first moult. They are as follows :—

Length : 3·5 mm. Head, heart-shaped, rather flat in front, shiny black. Plate on prothorax rather long and narrow, dark brown. Colour of body, dull yellowish brown. The dorsum is much wrinkled by subsegmentation. It has a faint stripe down the centre, darker than the ground colour, and with a more shiny surface than the rest of the body. There are no other lines or markings visible to the naked eye, but the microscope shows a good deal of mottling arranged roughly in lines, and somewhat similar, though weaker, to that seen in some Noctuid larvae (Catocalids, for instance). The skin is shiny. It is rather thickly covered with small, dirty whitish blotches, too numerous to be *all* primary tubercles, though these are similar in appearance. The hairs (rather long, whitish to the naked eye, colourless under microscope) grow from the primary tubercles. They are curved forward on head and on the prothorax, and are plain. On the abdominal segments they are bifid, forming a Y. One hair only, to each tubercle.

Second Stage.—The same larva was resting for the second moult on June 7th, and I then made the following notes :—Length : 5·5 mm. Head entirely black. It is still heart-shaped, particularly with regard to the upper part, the lobes being well divided at the top of the head. It is pitted, and at the same time covered with shallow, irregular, wrinkled cells. It bears numerous short, whitish-brown hairs, and a few longer ones above the mouth parts and around the ocelli. The head is rather small in proportion to the body, which is plump and has much the shape of that of the larva of *Carcharodus alceae*, tapering rather abruptly towards the anal extremity. Prothoracic plate, black, resembling two short strips of black court plaster, one strip on each side of the dorsal centre, with small suffused break between. The neck is slender. Colour of body pale brownish. There is a distinct dorsal line of a darker brown colour, and outside that a considerable amount of brownish mottling, darker than the ground colour, and arranged in irregular longitudinal lines. The tubercles are small, dull white pimples, most of them bearing a single, rather short hair very slightly tinted brown. The hairs are more numerous, but proportionately shorter than in the first stage, and are no longer forked but spatulate, gradually increasing in width from the base upwards, the increase being more rapid towards the free extremity, which is cut off level or sometimes slightly split down the centre. The *long* hairs on the head are tapering, not spatulate. Those on the sides of the body are less frequently spatulate, particularly the longer hairs, which are curved backwards. The lateral area has also considerable brownish mottling.

The true legs are black. By transparence they are greyish black.

The spiracles are pale brownish discs set in slight depressions surrounded by wrinkles. The segmental incisions are well marked. When active in this stage, that is to say after feeding has commenced and before the preparation for the second moult has suspended activity, the larva has a greyish-green tinge due to the presence of food in the alimentary organ. At other times the larva to the naked eye is of a pale coffee-brown colour. The microscope breaks this up into paler, semi-transparent ground colour, and darker mottlings, and shows the dull white tubercles. The larva still feeds on the cuticle, not attacking the entire leaf substance. It draws together the edges of the leaf division in which it lives.

On June 9 I left Hyères for the Aisne Department, taking with me three larvae in a glass tube, two being in the 2nd stage and one in the 3rd. Whilst away from Hyères I fed these larvae on a common *Potentilla*, forming close growing patches on sandy soil. It had a slightly hairy leaf. They took to it without any hesitation. (At Samoussy I noticed *H. carthami* frequenting patches of this *Potentilla*.)

Progress was very slow. On my return on July 1 the larvae were still in the same stages, though they had grown considerably. In changing their food I removed them each time from the tents they made with the leaves, and after cleaning the tubes replaced them with some fresh leaves. Each one set to work at once to spin up a new tent, drawing together the edges of a division, or uniting two divisions to form a fairly roomy living-place. When moving, the larva spins silk continually. I believe it to have an aestivating habit. In captivity in a tube, where conditions were always moist, the torpid state was never fully developed, but progress became slow, and little eating was done. The larvae nibbled bits out of the edges of the leaves of their tents.

I had left the rest of the *sidae* larvae at Hyères on growing plants of *Potentilla hirta* covered with muslin. Soon after leaving the eggs, those from ova laid in the flowers went down to the leaves. Here they progressed until the 3rd stage was reached in some cases, others not going farther than the 2nd stage. About that time the plants dried up from want of water. When I returned to Hyères the plants were dry and brittle, and I was quite prepared to find the larvae dead. However, on opening up the dried leaf divisions, I found them looking comfortable

enough and quite lively, inside. They resented being disturbed, and sought to get back into their cylinders of leaf as quickly as possible. Evidently they were lying up and had not eaten for a long time. They were shorter and plumper than those I had with me, and of a lighter, ruddier colour. Had they felt the need of food it is probable that they would have wandered away, or have gone down to the bases of the plants where a few fresh shoots were showing. The normal atmospheric conditions in the Hyères district are dry and hot after May 15, and it is usual for most herbaceous plants to dry up partially or totally during the summer, sending out in some cases fresh leaves after the September rains.

Larvae living upon them, that do not feed up rapidly, must therefore fast or be satisfied with tough or dried leaves. The *sidae* larvae are quite capable of doing without food for long periods in summer, and I think it likely that they really aestivate under normal conditions.

This is a description (July 7) of a fasting larva in the 3rd stage :—

Examined with Hand Lens.

Short and plump. It contracts to less than 5 mm. in length. Head entirely black, appears rather more rounded than in preceding stages, and less heart-shaped. It is thickly sprinkled with light-coloured, rather stiff-looking shortish hairs. Anal end of body tapering abruptly. "Neck" rather darker than the rest of the body. Prothoracic plate brownish black. Body light reddish-brown. There is a tendency to semi-transparence. Central dorsal line dark red-brown, narrow but distinct. Several somewhat indistinct subdorsal and lateral lines of the same colour, irregular and rather wavy. Ventral surface and prolegs light reddish-brown.

Examined with Microscope.

On a lighter, somewhat flesh-coloured ground there is a thick mottling of red-brown, forming several indistinctly limited lines between the central dorsal line and the flange. There are very numerous whitish, conical tubercles giving the larva a white-speckled appearance quite visible under hand lens even. Each tubercle bears a rather stiff, whitish hair, swollen towards the free extremity, and to some extent fish-tail shape. Those on the flange and on the last few abdominal segments are longest. Those on the head are not swollen at the end. Spiracles are almost round, light-brown rings, placed very high above the flange fold it seems to me. (This is perhaps characteristic of the *Hesperidae*.)

The larvae which have been kept in tubes have the ground colour much darker. They are coffee-coloured, in fact.

From July 8 to October 17 I was away from Hyères, travelling about most of the time in the Pyrénées Orientales. I had four larvae with me. Two of them, which I had kept in tubes from the 1st stage, fed slowly all through the summer, reaching, I think, the last stage or, at any rate, the one preceding it. They died in September from a fungoid disease which declared itself as a small black scar on the back of one of the abdominal segments. The scars did not appear to interfere much with the larvae at first, but after a week or ten days they fed much less, and finally ceased feeding altogether, though they remained plump. The one first attacked I found dead and stiff in the tube one day, quite a month from the time the disease first appeared. The other, in which the disease was already advanced, died soon after in the same way. The scars had enlarged considerably during the course of the disease. They looked like charred cork on the skin. Two other larvae which I put in tubes towards the end of July, and which had then not fed for fully six weeks, started to eat a *Potentilla*, which is common generally in ditches and along roadsides. The moister atmosphere of the tube and the presence of fresh food made them active. Before this they had been spun up in dried leaves.

In mid-September, fearing that they might share the fate of the other two, I put them on a potted plant of *Potentilla*, covered the plant with muslin and left them out of doors. They spun up between the leaves at once, and for a fortnight I saw signs of feeding on those leaves forming the sides of the nests. The smaller of these larvae dried up in its nest, and I found it dead before leaving Vernet. I brought the other back to Hyères on October 17 and put it on a growing plant of *Potentilla hirta* which I dug up at the edge of one of the quarries behind the Villa les Rossignols near Costebelle. The country was very dry at that time, only a little rain having fallen in September. However, I found the plant and others with plenty of green leaves around the bases of the dead flower stalks.

The larva, which was then in the 4th stage, spun up between two leaves without delay, and for a time it fed on them.

But after the beginning of November I saw no trace of

any fresh feeding, and on January 7, 1910, I noticed that the tent was still very well sealed up, as it had been for two months. The weather was very cold, with several frosts at the end of November and beginning of December, mild and damp from the middle to the end of December. It was fine and calm in January, with warm days and cold nights, there being sometimes a little frost. The winter tent is tightly closed by an inner lining of silk. It is not at all conspicuous. Three of the spun-up leaves composing it have died and are blackened; others are green and faded yellow.

At the beginning of March I opened this tent and found it empty. The larva had recently left it and had made a much larger tent on the other side of the plant. Five leaves had been drawn together for this purpose. The nest was well concealed. It was almost completely closed up by the silk work inside. Some of the divisions belonging to the tent leaves, and one or two adjacent leaves had gaps in them, showing that the larva had fed. It was then in its final stage (5th ?), but I could find no cast skin or head case in either the winter tent or in the new one. It was certainly not in this stage, however, when it went into winter quarters. The nests had hardly any frass in them.

Throughout the month of March the larva lived in the same nest. Although I kept as close a watch on it as was possible, I never saw it outside its tent or feeding. It ate very little; only a few free divisions of those leaves composing the tent and two other leaves near by bore any traces of feeding. I am not able to say at what time of day or night it feeds. It certainly did not leave its tent for long at a time. Its movements were slow when disturbed, and were always preceded by much silk-spinning.

At the beginning of April the larva was well advanced in the last stage. On April 3 I made some notes on its appearance. It was then 20 mm. in length. Width of head 2·75 mm.

Head rather large, each lobe top rising slightly above the central division but not enough to give the appearance of horns; it is rounded, with no sharp angles; colour uniform dull black, surface granular; labrum pale yellow, shiny; antennae and jaws black. The head is covered with rather short, stiff-looking brown hairs, and a few much longer hairs with a bend in them. These hairs, four or

five times as long as the short hairs, are developed from the primary head tubercles. The chitinous parts of the feet are jet black, the joints and bases dirty whitish yellow. Neck narrow, quite smooth and of a light sepia colour. The rest of the prothorax is smooth with the exception of the black transversal plate divided by the dorsal centre. Each half of this plate extends from the dorsal division to the level of the prothoracic spiracle. It is somewhat shiny, and bears several stiffish hairs curved forward. The division is a narrow, dull white line, continued on the succeeding segments as the brownish-black dorsal line.

The form of the body is similar to that of *Carcharodus alceae*. The body is capable of great extension and contraction. The segmental incisions are well marked but not very deep. Body tapers rather rapidly after abdominal segment 6. Anal flap flattened and rounded. The colour of the body is something between sepia and coffee colour, darker on the dorsum than beneath. The central dorsal line is dark brown, darker than the ground colour, but the contrast is not sufficient to make the line very striking or distinct. There are signs of two other dark lines between it and the spiracles. They are very much suffused. Under the hand lens the dorsum appears thickly sprinkled with dull whitish tubercles bearing light brown hairs of different lengths, none being more than about 1·5 mm. The white hairs of the food plant are often caught in these hairs. On the first two abdominal segments a distinct though narrow, dull orange spiracular line is seen. It becomes very faint on the 3rd abdominal segment and is hardly distinguishable beyond that. No trace of this line on the thoracic segments. The flange has a semi-transparent appearance when seen from below, and is brownish-orange, rather lighter than the general ground colour.

The roundish-oval chitinous ring of each spiracle is set on a small mound of dull brownish orange. The ring itself is light red-brown. The bases of the prolegs are slightly darker than the surrounding tissue. They are hairy.

Under microscope × 40 approx., one sees that the numerous whitish tubercles covering the upperside of the body resemble to some degree those of Pierid larvae. Many of them terminate in a shallow cup from the centre of which a hair grows. The edges of the cup appear chitinous. Amongst these upstanding tubercles are a few considerably larger cups or lenticles set on truncated tubercles. Judging from their position, they may represent the primary tubercles; but if this be the case the tubercles have undergone considerable modification. These large cups have very neat circular borders of brown-black chitin. They look, in fact, somewhat like

spiracles, but they are quite round and have no visible vent. No hairs grow from them.

The hairs are slightly swollen at their free extremities.

The larva of *H. sidae* has a habit of ejecting its excrement with violence, throwing it a considerable distance away. I observed this operation on several occasions.

The excrement was expelled gently until nearly the whole mass had appeared, then suddenly it was shot away, falling as nearly as possible 50 centimetres from the larva.

I did not notice any movement on the part of the larva which would account for this, but Dr. Chapman tells me that Hesperid larvae are provided with an internal comb which enables them to get rid of their excrement in this way. The comb must be worked by a strong muscle. I had the larva out of its tent when this performance took place, but when inside the tent the end of the body is no doubt pushed out, and that would account for the very little frass found in the nests. There was particularly little in the spring tent in which the larva has been living since it left its winter quarters. The larva was taken out of its tent, early in April, to be photographed. This was not an easy matter, as it is very restless when interfered with, and seeks to hide itself under the leaves, especially when exposed to sunlight.

As soon as the operation was over it was put back into the tent, but it did not stay there this time, for I found, a day or two afterwards, that it had made a new, roomy dwelling-place. To do so it had bitten right through the stems of two leaves, arranging them upside down to fill up gaps, and binding them with strong silk strands spun on the inside, to the other leaves entering into the composition of the tent.

On April 14, Dr. Chapman, searching on the *Potentilla hirta* plants in the Plan du Pont valley, found a 4th stage larva of *H. sidae* in its tent. It was small, about the size of my larva when it went into winter quarters last November. The tent it was in was not a winter nest but a new spring tent.

It seems probable from this that the insect passes the winter normally in the 3rd or 4th stage, but, as the larva subsequently proved to be ichneumoned, it can hardly be regarded as a normal larva, and may have been retarded

by the parasite. Dr. Chapman has found that ichneumoned larvae are sometimes stimulated into more rapid growth by the parasites, but there are also cases in which an opposite effect is produced, and this looks as though it might be one.

Dr. Chapman very kindly handed the larva over to me. It had the dark dorsal line more distinct than in my 5th stage specimen. There is a fairly distinct, whitish, double subdorsal line swelling out slightly on each segment and contracting towards the incisions. The ground colour is rather lighter than in my specimen. With the microscope I see that the double, white subdorsal line consists mainly of large, white, hair tubercles arranged in rather irregular line. The hairs seem a little darker than in the other larva. The lenticles are not numerous. There is one well outside the central dorsal line on the first subdivision of the abdominal segments and another on the lower edge of the white subdorsal line on the third subdivision. Thoracic plate (scutellum) black and shiny, more conspicuous than in the larger larva. Lateral area with a dull orange suffusion along the abdominal segments. This caterpillar made a small tent in the *Potentilla* leaves and shut it up pretty closely.

Opening the tent on April 21, I found the larva dead. Its skin was inflated by the cylindrical cocoon with rounded ends, of an ichneumon. The cocoon had not broken through the larval skin, which was now dark grey, lighter on ventral surface, and with two suffused black dorsal blotches. From the dead larva a small ichneumon emerged on May 2, through a hole it made in the skin.*

The full-grown larva which I had reared from the egg, settled itself for pupation about April 19. It had not then changed colour.

On April 21 the whole dorsal and ventral area had become dull reddish, with the exception of a livid, whitish patch on the sides of the thoracic segments. This patch was sharply defined on its upper edge where it met the dull red colour of the dorsum.

The plant had been exposed to the sun, and I feared that, in spite of its thick tent, the larva had been killed by overheating, for caterpillars that have been killed by

* Mr. Claude Morley reports this specimen is a species of *Limnerium*, a male, and that its "pupa looks as though the *Limnerium* were hyperparasitic on *Rhogas* sp."

heat often show the same reddish tint. However, I soon discovered that it was quite lively, moving the fore part of its body from side to side when touched. It was well attached to the silk lining the nest by the hooks of the anal pair of prolegs. There was no other attachment.

The pupa had formed by the morning of April 22. It was fixed to the silk by the cremastral hooks, and the larval skin, shrunken to a small wad, was tucked under the abdomen near the end of the body.

The pupa is thickly covered with a white, floury substance which hides its real colour. When this is rubbed off, the wing cases are seen to be of a shade between putty colour and light mahogany; thorax, head and abdomen mahogany, the abdomen lighter beneath. Cremaster dark mahogany.

Shape.—Head large and broad; eyes large and prominent. Thorax broad, rounded, not very prominent; cremaster long, with a very slight ventral curve. The proboscis, leg and antennae cases are fairly prominent. The proboscis exceeds the apices of the wings, reaching to the posterior edge of the 4th abdominal segment. The upper line of profile when the pupa is lying on its back, runs up gradually to the 3rd abdominal segment (under wing cases), after which it curves downwards again towards the cremaster. The profile of the dorsum, after the swelling of the thorax, shows a straight line to the posterior edge of 4th abdominal segment, after which it slopes to the cremaster. Excepting on the appendage cases, the pupa is hairy. The hairs are light brown, short, and not very numerous. The eye parts, with the exception of the glazed eye, are hairy. On the top of the head the hairs curve forward, on the abdominal segments they are directed backward, and are more numerous and longer from the 4th abdominal segment to the cremaster. The thorax has not many hairs. They are shorter and scarcer on the ventral surface of abdominal segments than on the dorsum.

Total length 18 mm.; length of cremaster 1·6 mm.; from anterior extremity to apices of wing cases 12·2 mm.; width across eyes 3·6 mm.; across shoulders 5 mm.; across 3rd abdominal segment 5·6 mm.; depth of thorax 5 mm.; of 3rd abdominal segment 5·2 mm.

On May 10 the eyes had darkened, and the wing cases were of an opaque putty colour beneath their floury covering.

By May 20 the pupa was dark, and the wing cases showed the white markings of the imago on a black

ground. The glazed eye was quite black and the antennae cases dark. The butterfly should have emerged about this time, but after May 22 I concluded that it was dead. The abdomen had then shrunk considerably in length and girth. When I left Hyères for Algeria early in May, I had to remove the pupa from the tent in which it lay on the growing plant, and on the journey it probably suffered from want of moisture. The imago, as I found later, had fully formed but had died and dried up within the pupa case.

Explanation of Plate XLVII.

Fig. 1. Larva (magnified) of *Hesperia sidae*.
2. Pupa (natural size) of *Hesperia sidae*.

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H. Powell, photo. *C. Hentschel.*

1. LARVA (magnified). 2. PUPA OF HESPERIA SIDAE.

XXV. *Some Remarkable Ant-friend* Lepidoptera *of Queensland.* By F. P. Dodd, F.E.S. *With Supplement,* by E. Meyrick, B.A., F.R.S.

[Read June 7th, 1911.]

Plate XLVIII.

These three species of stout, greasy and sober-coloured moths are scarcely likely to attract the attention of an entomologist, who, unless he knew something of their histories, would perhaps regard them as rather uninteresting insects; however, their life histories are most extraordinary, and I consider myself extremely fortunate in having, to a great extent, worked them out, so it is with much pleasure that I now impart the information acquired. Though the histories of two of the species are incomplete I think that we can fairly correctly surmise much that has not yet been actually learnt.

The moths have been bred out by me, from cocoons taken in the bush during the past three years or longer: quite early I found what proved to be a larva of the largest species, thus establishing the connection between it and the cocoon and moth. My remarks are now solely confined to this one species, *Cyclotorna monocentra,* Meyr.

Finding that the cocoons were invariably in the vicinity of the nests of the well-known Australian mound ant, *Iridomyrmex purpureus,* and that the supply did not decrease in the hottest and most droughty periods, when no food for the caterpillars seemed available anywhere near the ground, I suspected that they were ant-associates and to be found in the nests of those insects, therefore I broke down or dug up many of the termite mounds which these and other ants take possession of for homes, and at last to my satisfaction found several of the strange and handsome caterpillars. Later on in the year others were dug out, and as they were always in the chambers containing ant grubs, it was a simple matter to ascertain that the grubs were preyed upon by the caterpillars. During the past twelve months I have obtained from one nest seventy caterpillars, and from another about fifty, but

such numbers are exceptional, these two nests being large and favourably situated; it was not often that I found as many as twenty in one habitation.

Having taken larvae in various stages of growth, I was greatly puzzled at being unable to obtain them below a certain size; however, I eventually found under the bark of a tree, near a nest, a number of small oval, flat and recently spun cocoons, and upon opening one observed a bug-shaped larva, and very naturally supposed it was that of a new carnivorous insect, as the cocoon much resembled another flat and almost circular one known to me, and also had the "frogmouthed" opening characteristic of cocoons spun by the several species of ant-friend caterpillars which I found here. To my surprise these small cocoons produced *caterpillars, totally different in shape from the one I had seen three days before,* in fact they were similar to the small larvae which I had found in the ants' nests, though less brightly coloured. Here, then, was a discovery; but why had I failed to meet with the bug-like larvae in the ants' nests, for there one would suppose them to be? Many weary hours were spent in searching the interior of different mounds in the hope of finding these tiny caterpillars, but all in vain, and I feared that they were never to be found by me, for I did not relish delving away at the hard mounds and having to submit to the bites of the infuriated ants, for they have strong, sharp mandibles and nip most unpleasantly; they are in countless numbers and swarm rapidly up one's legs and along the handles of the digging instruments, and fight to the death. Though always keeping my trousers well tied at the bottom when amongst the ants, I find it impossible to stay there beyond a few minutes at a time, for many get under the clothing, and lively moments ensue in battling with them. Those on the legs can be shaken off, or beaten down, many being killed, then scores more squeeze into one's boots, and are crushed. It is a pity that in the fierce defence of their homes such results follow—they deserve as considerate treatment as possible, for so much deeply interesting knowledge is to be gained by studying them; then they are such willing and energetic workers, and harmless enough until interfered with, and though they bite sharply they inject no irritating poison.

Last year (1902) I spent much time in forming a collection of the ants of this district, adding such homopterous

or other insects which I found them fraternising with, but I had left the red ant until almost the last, for it could have been added at any time; however, I finally took the species, and as it varied much in size and colour I collected it from several localities. One day a small boy of mine whom I had sent to a particular spot for several of them and their *Jassidae* friends, where I had taken some only a few weeks before, when bringing me the required insects remarked that there were several reddish ticks on the *Jassidae!* Examination showed that they were *lepidopterous larvae*, so I rushed off at once with this now precious boy to the tree upon which he had found them. There proved to be many of the homopterous insects on the tree, in groups here and there, and upon a considerable number caterpillars were to be seen. I now had but little doubt that these were the long-sought-for ant-friend larvae in their first stage; however, selecting the hosts with the larger larvae, and keeping them under glass, I soon had the satisfaction of seeing the latter crawl away and commence to construct the cocoons, and upon the third day the altered larvae emerge. Upon leaving the cocoons they would move but a short distance, then assume quite a peculiar attitude, thus, resting upon the abdominal legs the front segments were raised a little and the terminal ones turned over the back, so that the tails often projected beyond the head, at the same time the anal parts and claspers were stretched out as far as possible. This position, in a somewhat modified degree, is frequently assumed by the larvae, often for many minutes at a time, throughout their existence, and the reason for it has lately been made apparent to me, and is explained further on.

To ascertain how the soft little larvae reached the ants' nests, often many yards away, was the next matter, so I took several to the tree and placed them in the way of ants, who as soon as they became aware of their presence, would eagerly examine them, then the larvae, touched by the ants' antennae, would endeavour to raise their uplifted segments higher than before and further thrust out the already distended claspers and anal parts. When an investigating ant came to these protruding parts she seemed thoroughly satisfied, for she would then quickly seize the larva and bear it off to the nest. So ends the first larval stage; what a change for the little thing, to be carried away from the fresh air and warmth of the

sun, and placed in a dark, stuffy and often deep cell, and there to stay for many weeks, or for months, according to the time of the year, amongst the bustling ants and their heaps of larvae, and to subsist upon the latter instead of the sweet (?) *Jassidae*—the grubs of the ants may be sweet, too, still my thirst for knowledge has not yet prompted me to settle the point by tasting them. No wonder the little creatures seem to preserve pleasant memories of the bright world from which they have been conveyed, and attempt to return, usually just after sunrise as the ants start out on their day's foraging, but they are seized and hurried below again, their guardians knowing what is best now for them, for outside they would assuredly perish. Or they may, owing to their stay and change in the cocoon, have forgotten their early days, and their visits to the light may be necessary and beneficial; but, assuming that they have not forgotten, I cannot state how long they may be in becoming reconciled to such changed conditions, but it must be many days, for from one nest alone I obtained about two dozen small larvae one morning, which were emerging from the holes and wandering about, but the ants seldom let them go far; these were many days older than those newly changed. One hot afternoon I came upon a nest, which was in the shade, where there was a young larva emerging and attempting to wander, in about fifteen minutes it came out four times, but was always captured before it had proceeded more than an inch or two. This was the only occasion upon which I saw a young larva out after the early morning.

The moths lay great numbers of eggs, which are placed apart on their sides upon twigs and pieces of bark near where the ants pass, and generally not far from a community of the homoptera, which are usually in various stages of growth, from the smallest larva to the perfect insect; freshly emerged caterpillars wend their way along the different branches which the ants traverse until they meet with any of these homoptera, large or small, when they crawl upon them. Upon small larvae I have frequently seen three young caterpillars holding on anywhere, but not permanently attached, one or two of which would come off again. As a parasite increases in size it will almost invariably be found upon the host's abdomen (unless, as it sometimes happens, it is crowded

out) with the head at the base; if the host is a pupa the forepart of the caterpillar is thrust well under the projecting wing sheath. A well-grown larva upon a pupal host of one species pushes the abdomen a little to one side, giving the victim a queer lopsided appearance, or it may be that a caterpillar completely covers the upper surface of a larva's abdomen, and even wraps a little over the end. In some species of *Jassidae* the larvae prefer to affix themselves to the dorsal surface of the abdomen or along the sides; in others, where the abdomen curves upward, the underside is chosen. The caterpillar spins a white floor of web to cling to, adding a little wall to this which leans over somewhat, the whole being comparable to the toe of a slipper; in this the head and several segments are protected from the pressure of the host's wing, if same is a pupa or imago, and from the movements of the legs, but the larger part of the insect is unprotected.

Occasionally, after a long dry period, there are not many groups of Homoptera about, so that the trees first to put forth young foliage soon carry numbers of these, and the moths freely oviposit on such trees, then strange sights are to be seen, almost every homopteron having its rider or riders, some with only one or two, others with three or four, and some of the imagos with seven or eight, mostly packed away under the wings, and forcing them apart. Recently I have seen several of these remarkably interesting communities, and amongst many overloaded imagos I took one with six good-sized larvae, and as I boxed it there were five more newly-emerged examples underneath, doubtless meaning to crawl on, too. Some of these overloaded imagos will be seen in the tubes exhibited. Where these insects are in such numbers the ants are exceedingly numerous, and they valiantly fight for their pets. As the season advances, and various trees put forth young shoots, the Homoptera and caterpillars become more scattered, and the latter might be overlooked. In approaching one of these social communities the ants quickly become alarmed, and rush about seeking for something to fight; then the Homoptera, many with their burdens great and small, doubtless understanding there is danger, toddle away as fast as possible to more protected spots, at the same time freely emitting their little drops of clear liquid; as matters quieten the ants again turn their attention to

their charges, and absorb these drops, they getting a more general supply than usual owing to the alarm occasioned by the intruder.

Though I have kept many of the parasitised pupae of the Homoptera none ever reached the perfect stage, but sickened and died, simply because they were shut up; nor have I seen a cast skin with the white web thereon, but the old skin disappears, being removed by the ants or blown away by the winds. I don't even know whether an afflicted larva will reach the pupal stage, but consider it highly probable that these changes do take place, for the insects with one or two parasites attached were always lively enough, but those with four or more were certainly not very frisky. Most of the affected pupae seemed to be smaller than those which were free. The *Jassidae* are restless creatures and cannot be confined and studied like the *Fulgoridae* and their parasite; they do not appear to feed in captivity, and soon become sickly and die, so I did not follow up this interesting subject, owing to want of time.

A caterpillar does not necessarily remain upon the same host, more than once I have seen one wandering about amongst the other insects, and in boxing them in situ they often dropped and hung by a thread; a few of mine crawled away, and of these one or two moulted, yet if they are undisturbed I do not think they leave their friends in order to shed their skins, owing to the manner in which they are cast, for the skin is not wrinkled or rolled up, it breaks away underneath, and in slowly loosening and coming off fairly well retains its shape; the skin in the larval cocoon cannot be said to be cast, the insect crawls out of it, if any of the cocoons be opened the perfectly shaped skins will be found within.

Description of the caterpillars in both stages must be left for one more advanced in that respect than I am. However, I shall endeavour to give an idea of what they are like.

The young examples, before their change, are egg-shaped and almost quite flat, at first they are dull yellowish in colour, later they become richly pink, but change to pale pink ere they depart from their hosts. After emergence from the cocoons they are even more flattened, and not so broad in proportion to their length, which is greater than before, and the sides are nearly straight. The edges of the segments are now formed like the teeth of a saw, and are

tipped with fine round fleshy points. The head is exceedingly retractile, and maybe is smaller than the head of any caterpillar of similar size known; before the metamorphosis it was always plainly to be seen, though often drawn in considerably, but is now well under the second segment, which projects a little over it and can completely cover and hide it from view. The points on the second segments are a trifle longer than those up to and including the eleventh, on the twelfth they are lengthened a little, and on the thirteenth extend into tails as long as the body. As the insect grows these tails do not lengthen proportionately, indeed at maturity they are scarcely longer than those upon a young larva. It is active and graceful in its movements, if one be placed upon its back it arches itself and turns over in an instant. The colour of a freshly-emerged, tailed individual is dull orange-red dorsally, the points and tails being colourless, in a few days this changes to bright pink, and in time becomes reddish. The ventral area is at first whitish, but gradually takes a bluish tint, by the time it is about one-third grown this is glassy greenish-blue, this colour is not in the skin but in the liquids, the blue liquid also shows faintly through the skin in places on the upper surface—the flat areas within the edges of segments. After a larva is about one-third grown it is in full possession of its fine colours, as follows: the second segment is bright ruby-red, the third to twelfth inclusive are crossed by strong, smooth, gently-arched, rich orange ridges, if I mistake not the spiracles are in these near the bases, appearing as dark specks. The dorsal line and a subdorsal one are mere irregular pale lavender streaks, interrupted by the ridges, upon each side of these lines are ruby-red patches, so that there are eight of them upon each segment—four in front of, and adjoining, each ridge, and four behind. Between the ridges and the serrated edges, running almost the extreme length of the insect, is a flat unbroken area, pale blue in colour, with a few of the usual ruby-reddish splashes here and there; the toothed edges are red at the bases, orange in the centres, and watery-blue at the tips. The ventral area is freely wrinkled, as before mentioned greenish-blue, but commencing well within and running through each segmental edge there is a broad, lengthened, bright orange-red streak; between the head and legs are four tubercles tipped with yellow, and four more, also yellow-tipped, between the abdominal and anal feet. The legs are brown and capable of free and quick movement. The tails are without colour at the bases, but blue towards the apices.

With these rough notes and the dried, blown, and spirit specimens, perhaps a fair idea of this freak caterpillar may

be gathered. Any larva placed in spirit, which is much better than formalin solution for this insect, loses all the blue colouring, but the reds and yellows remain. In carefully rolling out one for blowing the blue liquid comes away without admixture as a rule, following this there is a little whitish grease and several clear jelly-like strings; it is the least objectionable of numerous species of larvae which I have treated for blowing.

Though keeping many second stage larvae of various sizes, some for three weeks, I have never yet seen one moult, nor have I ever observed one to give any indication of casting a skin, yet I have taken several from the nests, about one-third grown, so exceedingly pale that I felt warranted in assuming that they had recently moulted. However, it is strange that I never witnessed any moulting change, though I had many scores under observation at different periods.

It will be seen how well the form of this caterpillar is adapted to its surroundings, its flatness enables it to exist in chambers where the roofs are low, for it has to get over a grub to suck it, and the thin flanged sides can be turned up to admit of it negotiating the narrow shafts and galleries of the ant habitation; some of these are extremely narrow, and in many nests a pea would not pass through the outlets, so that few would believe that a full-grown larva could pass through.

The caterpillar subsists in the second stage solely upon the ant grubs by sucking out their juices. A grub is first felt or examined, then the very movable claws grasp it more firmly and the small head becomes quite still, and tremors pass through the caterpillar, ending in slight upward jerks of the terminal segments, soon it is seen that the poor grub is collapsing, then when its skin has fallen in considerably it is abandoned and another one sought out and tackled. I have witnessed three grubs disposed of in succession in a few minutes by a large larva.

Reference has been made to the caterpillars raising their terminal segments, even the small ones from the cocoons doing so. This was quite sufficient to warrant investigation. Consequently at various times I have placed them with ants and grubs under glass, in order that they could be seen to advantage and without risk of disturbance. When the anal parts are protruded, an ant generally soon becomes aware of the fact, and will be

seen to pay these great attention. I soon noticed that a liquid, often perfectly transparent (it looks so on the blue-green ground, probably it was pale bluish), is emitted, and that it is greedily drunk up by the ants. Over and over again, with and without a lens, I have seen this issue, and the ants speedily absorb it. Some ants, perhaps hungry or more enterprising than others, would take in a supply from a second caterpillar. If an ant is not satisfied with the quantity given out, she deliberately seizes the protruding parts and gives them a gentle nip, the mandibles can plainly be seen to press upon the juicy flesh; if the hint is not immediately acted upon a more vigorous squeeze is given, and the tails may be gripped and pressed. This is very comical, the ant's meaning is unmistakable, and the caterpillar so thoroughly understands it, too, for a second hint never fails. This liquid, though frequently quite clear, is often mixed with yellowish matter, and at times some jelly-like substance is extracted; the latter the ants do not care about, for after the moisture is licked up this is in their way, and if they have not been imprisoned too long, will seize and tug at it until it comes off, and carry it to a spot set apart for waste matter, such as their own pellets and pupal skins, etc., are kept in. (A case moth larva—*Iphierga macarista*, Turner—is common in the nests, and as it is firmly and permanently affixed to the roofs of *empty* chambers I firmly believe that it acts as a scavenger by eating such matter, which must be carried to these chambers. I have seen sometimes fully twenty of these cases, all inhabited, in a single small chamber. Examples I had ate ant larvae and pupae, preferring them dry. Once I found several in a different ants' domicile, with fragments of ant cocoons sticking out of the ends of the cases.) Of course, only a few caterpillars comparatively are in one nest amongst the thousands of ants, numbers of which, therefore, cannot obtain any of this liquid food, so it follows that when several caterpillars and only a few ants are confined, the latter become surfeited, or weary of the sameness of their food, so seek it less frequently, and are not so particular in their attentions, therefore their friends' vents become clogged (especially is this the case with small larvae) owing to the moisture evaporating and the matter hardening, so that they get in a bad way. Often a larva holds its terminal segments aloft for a considerable time, but the invitation, or in a

case like this, signal of distress, is disregarded. None of the liquid or matter is ever dropped, but when portions of the latter are left by the ants, it will whilst soft adhere to the box when the larvae happen to wander about. The exhibits include a piece of paper showing frass marks of neglected larvae. In my earlier experiments with the small tailed larvae by themselves, also the larvae of the next species, they sickened and died in several days, but after ascertaining the cause others were easily kept alive, without the ants, for three weeks, by cleaning them with a small soft brush dipped in warm water; of course fresh grubs were supplied at intervals, so I suspected that the ants performed the necessary duties and finally verified my suspicions. So we find that the caterpillars are of the same service to the ants as many Lycaenid larvae and various homopterous insects, including the so-called "ant cows," the Aphides, and that they are not possessed of special emitting tubes like most of these.

Occasionally an ant will lick or brush a caterpillar, and run its mandibles over the points of the segments, and I have seen the latter apparently doing the same to a companion, though it is not of common occurrence, but the caterpillars often do something similar to the ants! This process of licking, brushing, or whatever it may be, is quite an everyday performance, and I cannot give any information as to its meaning, though I suppose there is something obnoxious to the ants which they desire to have removed. An ant clearly exhibits an inclination to undergo this operation, and will stand or crouch by a larva for some time, awaiting its pleasure to attend to her. Should the larva have its forward segments held up she will run under, but if they are not she will make the most strenuous endeavours to induce it to raise them so that she can get underneath. Whilst the operation is proceeding she crouches or lies down, and evidently enjoys herself, judging by her quiet and general behaviour and the gentle motions of her antennae. The operator holds her down and briskly runs its head over and about her, the bases of the hind-legs and the petiole being the places principally engaging attention; however, the small quickly-moving head performs some service greatly to the relief of the ant. The operation may last two or three minutes, now and then an ant becomes restless and struggles a little, upon which she is released, and she moves away, then spends a few

moments attending to her legs and antennae, finally running off a much happier creature; whilst one ant is being attended to, another may stand by to take her turn when number one departs.

The larvae crawl with a fairly brisk and slightly undulating motion. They are not nervous or irritable, and will wander about the hand without caring if they are touched or stroked; the head may be drawn in for a brief moment, but the journey is continued, and very often the forward segments are uplifted and the head turned about in an inquiring manner. Quite as a matter of course one will mount another and be carried about, and stay there by the hour, even should the other be engaged in spinning, the spinner apparently not concerned or inconvenienced in the least. Sometimes one cocoon is spun upon another, even out on the trees; amongst exhibits there are several of these.

When the period for pupation arrives the caterpillars move out of the nests in the early morning with the ants, and travel along with them to the nearest trees which they are in the habit of ascending, then seeking out a crevice to get into, or a fragment of bark to creep under, they commence their cocoons, small parties of ants taking an interest in the process, their presence probably due to a desire to receive a last taste of the larval liquid, for before the roof of the cocoon is far advanced some larvae emit a little of this, which wets the threads above—this, by keeping the ants in attendance, doubtless is a provision against the attacks of ichneumons. There are usually several ants about a cocoon if the moth has not emerged. The cocoon has a wide "frog-mouthed" slit, like those of the two following species and the Fulgorid insect. As a rule it is pale salmon pink in colour, and its construction is an undertaking of many hours—often after four hours of work the larva is not quite hidden, though it works rapidly; the walls are gone over repeatedly and are made tough and strong ere the roof is commenced, then for long after the larva can be discerned through the gradually thickening top. Owing to the presence of the ants few larvae are parasitised whilst spinning, but a dark wasp-like ichneumon succeeds in victimising them now and then, only one fly coming from a cocoon; to escape it bites through the top of the cocoon, that being the weakest part. Though a larva may wander from the ant path and

pupate upon a twig or grass stalk, it is seldom that the pupal shell is met with; this protrudes and is removed by the ants and carried into their dwellings.

The pupa forces its way through the "lips" of the cocoon, which close upon its terminal segments and hold them securely whilst the moth bursts the shell. All cocoons shown with the protruding pupal shells are from my boxes or were taken in the bush soon after construction. The moths emerge about 4 p.m. on the nineteenth or twentieth day after spinning. Expanse of the ♂ is about 23 mm., and of the ♀ 28 mm.

Though I have referred to this caterpillar as a friend of the red ant, I occasionally met with it in the company of a large blackish insect whose nests are usually at the foot of trees. This is a widely different species and the pupae are enclosed in cocoons, those of the red kind are naked. Once I found small, black ants amongst some homoptera and caterpillars, but they had probably driven off the red insects, for a habitation of theirs was not far away.

Cyclotorna experta, Meyr. I never actually bred this species from larvae in my possession, nor have I had the larvae in two stages, but have taken pupae from above the nests where I had dug out young examples. As the ants' paths led to trees upon which there were often groups of *Jassidae* during the year, similar to the species upon which the other caterpillars were to be found, I have no doubt whatever that it has two larval stages. It is a smaller insect than the preceding, and the larvae have all the same habits; they are coloured almost exactly the same dorsally, but those I had at different times were too small to show whether eventually they became blue on the underside. It was found but rarely in only one locality, and never in company with the other caterpillars.

Cyclotorna egena, Meyr. At first I found the cocoons upon trees near the red ants' nests, and bred out the moths, but failed to discover the caterpillars for a considerable time; finally I noticed a tree with great numbers of small Psyllidae thereon, and the ants in attendance, so I searched and found several of the extraordinarily flat and almost circular larvae now exhibited; they were moving about amongst the other insects, to which they paid little attention, but would stop now and then and apparently eat at tiny sugary-looking masses upon the branches, which with the aid of a lens I took to be discharges of the Psyllidae hardened. As there were also

several cocoons upon the tree I am perfectly satisfied that they were formed by these larvae. It will be seen that this little caterpillar, with its flattened-out segments with their fine tissue edges, can adhere to a surface as closely as any scale. The head is visible when the insect is progressing, but is withdrawn at the least alarm, and the edges of the segments are closed tightly down all round, so that the creature resembles a flat scale or a mere circular discoloured patch on the bark of the branch. Included with exhibits are some small Ichneumonidae which emerged from several of my pupae.

SUPPLEMENT.

By E. Meyrick, B.A., F.R.S.

The three species mentioned above all belong to the genus *Cyclotorna*, Meyr., of which at present I know no other representatives. To the generic characters as given by myself I may add that there is a tuft of scales from beneath eye, covering lower half of eye; and that in *C. egena* vein 3 of hindwings is absent, a modification probably connected with its reduced size.

Cyclotorna monocentra, Meyr., Proc. Linn. Soc. N.S. Wales, 1907, 72.

The darker suffusion towards costa, before middle of forewings, is sometimes extended to form an inwardly oblique fascia reaching more or less nearly to dorsum. The transverse-linear form of the discal mark distinguishes this species immediately from both the others, in addition to the larger size.

Cyclotorna experta, n.sp.

♀. 19–23 mm. Head and thorax fuscous mixed with whitish. Abdomen fuscous. Forewings elongate, moderate, costa rather strongly arched, apex rounded, termen obliquely rounded, dorsum strongly arched before middle; fuscous, more or less sprinkled with grey-whitish, in one specimen mostly suffused with whitish, with scattered dark fuscous scales; an undefined patch of dark fuscous suffusion in disc before middle; a dark fuscous dot or dash on fold beneath middle, representing plical stigma; second discal stigma large, roundish, dark fuscous, anterior edge sometimes excavated so that it becomes crescentic: cilia fuscous, sometimes sprinkled with grey-whitish. Hindwings with vein 3 present; rather dark fuscous; cilia fuscous.

Townsville, Queensland (*Dodd*); from October to January, five specimens.

Cyclotorna egena, n.sp.

♂ ♀. 10–15 mm. Head and thorax fuscous mixed with whitish. Abdomen fuscous. Forewings elongate, costa moderately arched, apex obtuse, termen very obliquely rounded; purplish-fuscous, sprinkled with dark fuscous and whitish; a very obscure darker transverse discal spot at $\frac{2}{3}$: cilia fuscous. Hindwings narrower and more pointed than in the other species, 3 absent; dark fuscous; cilia fuscous.

Townsville, Queensland (*Dodd*); two specimens.

I note that the pupa is protruded from the cocoon on emergence; the antennal cases are separate, and remain entire after dehiscence. The secondary larval form has much resemblance to a woodlouse (*Oniscus*), probably partially due to adaptation to similar circumstances. The term "ant-friend" seems scarcely accurate, the moth appearing to have by far the best of the bargain; one is reminded of the crocodile styled "protector of the poor"; the unfortunate ant, blinded by his partiality for liquor, overlooks the fact that it is produced entirely at the expense of his own larvae devoured; the moth, on the other hand, is merely getting rid of a by-product of his digestive system, whilst obtaining free quarters, shelter and protection from enemies, and a permanent food-supply in all seasons. The whole life-history is most curious, and as an instance of double parasitism unique, so far as I know.

On careful consideration of these insects I am of opinion that the genus is an isolated one, representing an early form of the *Tineina*. In the forewings vein 1b has a spur rising from the lower basal fork, analogous to a similar structure in the *Psychidae*; vein 12 is exceptionally thickened and strong. In the hindwings vein 1b forms a long *apical* furcation (1a and 1c being both also well developed), a structure apparently unique; it has a strong basal fork as well; vein 8 is also unusually thickened. I consider these characters sufficient to constitute *Cyclotorna* the type of a new family, *Cyclotornidae*.

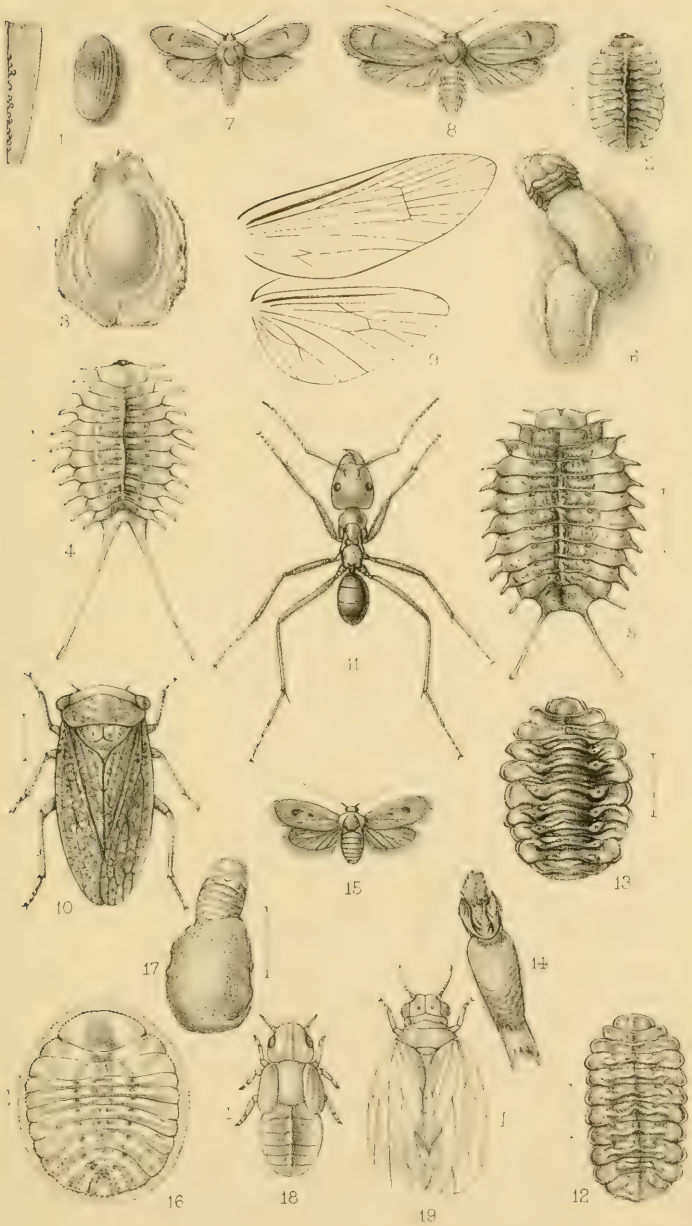
Explanation of Plate XLVIII.

[*See Explanation facing the* Plate.]

Explanation of Plate XLVIII.

Fig.

1. *Cyclotorna monocentra*, group of eggs, with one greatly enlarged.
2. „ „ , larva in first stage.
3. „ „ , flat cocoon (on leaf-fragment) for transition between stages.
4. „ „ , young larva in second stage.
5. „ „ , full-grown larva.
6. „ „ , cocoons.
7. „ „ , ♂ imago.
8. „ „ , ♀ imago.
9. „ „ , neuration.
10. „ „ , Homopterous host of first stage.
11. „ „ , ant host of second stage.
12. *Cyclotorna experta*, younger larva.
13. „ „ , full-grown larva.
14. „ „ , cocoon.
15. „ „ , ♀ imago.
16. *Cyclotorna egena*, young larva.
17. „ „ , cocoon.
18. „ „ , Homopterous host, immature.
19. „ „ , „ „ , winged.



H. Knight del. West, Newman imp.

ANT-FRIEND LEPIDOPTERA AND THEIR HOSTS.

XXVI. *An Enumeration of the* Rhynchota *collected during the Expedition of the British Ornithologists' Union to Central Dutch New Guinea.* By W. L Distant.

[Read October 4th, 1911.]

Plate XLIX.

The collection of *Rhynchota* brought home by this expedition consists of fifty species, of which ten are described as new, while it has been found necessary to propose three new genera. In 1888, and in the Transactions of this Society, I had the pleasure to give the results of an examination of the *Rhynchota* collected by Mr. Sayer during Mr. Cuthbertson's expedition to New Guinea. The number of species than obtained was forty-eight, so that the results of the present expedition, in the face of many hindrances, is in a Rhynchotal sense not unsatisfactory. It is at the same time far indeed from being exhaustive, and only affords a sample of the material which we may expect as the result of another expedition under more fortunate circumstances.

The species here enumerated were all collected by Mr. A. P. R. Wollaston, and on the banks of the Mimika and Wataikwa Rivers.

Suborder HETEROPTERA.

Family PENTATOMIDAE.

Tectocoris lineola.

Cimex lineola, Fabr., Spec. 2, p. 340 (1781).

Var. *cyanipes.*

Scutellera cyanipes, Blanch., Hist. des Ins., iii, p. 159 (1840).

Mimika River.

Calliphara flagrans.

Tetrathia flagrans, Walk., Cat. Het., i, p. 24 (1867).

Calliphara flagrans, Dist., Ann. Mag. Nat. Hist. (7), iv, p. 38 (1899).

Walker could give no locality for his type which was founded on a unique unlocalised specimen. Mr. Wollaston took two specimens which appear to be only a very slight variety of Walker's species, which probably also came from New Guinea.

In this variety the coxae and bases of femora are practically concolorous with the legs, and the marginal luteous fascia to the abdomen beneath is broader.

Wataikwa River.

Mimikana, gen. nov.

Moderately short and broad; head longer than broad, the lateral lobes longer than the central and distinctly spinously, porrectly produced in front of it, lateral margins sinuate, eyes large, moderately porrect, a little upwardly and forwardly produced, well separated from the anterior angles of the pronotum, ocelli wide apart, near base of head; antemiferous tubercles obtusely spinous; antennae five jointed, first joint passing apex of head and subequal in length to fourth joint, second, third and fifth a little longer and subequal in length; pronotum broader than long, the anterior angles broadly, longly, subspinously, anteriorly produced considerably beyond eyes, lateral margins concavely sinuate, the lateral angles moderately produced and very slightly recurved, posterior margin truncate in front of scutellum, anterior margin slightly concave; scutellum longer than broad, the apex subacutely rounded, narrowed at about two-thirds from base; corium longer than scutellum, apically widened, the apical margin rounded; membrane about reaching the abdominal apex, with about six longitudinal veins, the fourth and fifth furcate; connexivum exposed with the apical angles to the segments distinctly tuberculous; rostrum reaching the apex of the second abdominal segment, third joint much longer than fourth, first joint reaching apex of head, bucculae prominent; mesosternum distinctly centrally carinate; abdomen centrally broadly sulcate for about half its length, spiracles prominent.

This genus is allied to *Alathetus*, Dall., from Jamaica, which Stål placed with doubt in the *Discocephalinae*, and which Dallas, its describer, placed in his *Halydinae*. I am inclined to think that the latter is the more natural position for both *Alathetus* and *Mimikana*, though they may eventually form a division to be placed at the commencement of the *Halydinae*.

Mimikana wollastoni, sp. n. (Plate XLIX, fig. 4.)

Black; antennae finely pilose; head above more or less transversely striate; pronotum rugulose, sparingly coarsely punctate, more or less ochraceously pilose; scutellum distinctly punctate, obsoletely so on apical third; corium finely but irregularly punctate; membrane bronzy-brown; the nodulose apical angles of the connexivum, castaneous; head beneath and sternum coarsely punctate, disk of mesosternum opaque and more finely punctate; abdomen beneath glossy-black, finely wrinkled and obscurely punctate, the lateral margins opaque; other structural characters as in generic diagnosis.

Long. 17 millim.

Mimika River.

Elemana, gen. nov.

Suboblong; head a little longer than broad, lateral lobes longer than the central, their apices roundly inwardly curved but widely separated; antenniferous tubercles prominently spined, the apices of the spines turned inwardly, ocelli at base, nearer eyes than to each other, eyes large, transversely produced, scarcely projecting beyond the anterior angles of the pronotum; antennae five jointed, first joint slightly passing apex of head, remaining joints longer and almost subequal in length; pronotum about twice as broad between the lateral angles as medial length, lateral margins sinuate and on their anterior halves distinctly crenulate, the lateral angles slightly and subacutely produced, posterior margin truncate before scutellum, anterior margin moderately excavated for the reception of the head; scutellum longer than broad at base, the basal angles blackly foveate, apical fourth slender and rounded at apex; corium distinctly longer than scutellum, its apical margin oblique, the inner apical angle rounded; membrane prominently obliquely veined, the veins about six in number, the second furcate, and with a short transverse basal cell; rostrum reaching the posterior coxae, first joint not reaching base of head, second scarcely passing the anterior coxae, third reaching the intermediate coxae; metasternum slightly raised and broadly grooved between the coxae; legs of moderate length, femora considerably longer than the tibiae, anterior femora very shortly and obscurely spinous near apex. Mesosternum injured by pin, but apparently centrally, longitudinally ridged; abdomen very obscurely centrally longitudinally sulcate; tarsi three jointed, second joint small.

Allied to *Edicius*, Dist.

Elemana propria, sp. n. (Plate XLIX, fig. 6.)

Body above more or less ochraceous; the foveate basal angles of the scutellum, two small spots on anterior margin of pronotum, and the membrane black, extreme apical area of the latter between the veins, pale testaceous; antennae finely pilose, black, first and second joints and base of third ochraceous; head coarsely and at base linearly punctate; pronotum coarsely punctate and moderately wrinkled, transverse cicatrices on anterior area smooth and palely piceous; scutellum very coarsely punctate on basal third, remaining surface more finely punctate; corium finely punctate, its apical margin narrowly dull sanguineous; body beneath pale luteous, head beneath with a few black punctures, prosternum somewhat thickly blackly punctate, meso- and metasterna laterally pale testaceous, opaque, with some black lines, a small black spot at the bases of the coxae; abdomen beneath almost smooth, shining; spiracles and apex of rostrum, black.

Long. 11½ millim.

Mimika River.

Coccoteris winthemi.

Halys Winthemii, Guér., Voy. Coq. Ins., p. 170, pl. xi, fig. 18 (1830).

Wataikwa River.

Ectenus, sp. ?

Mimika River.

Antestia, sp. ?

Mimika River.

Lyramorpha diluta.

Lyramorpha diluta, Stal, Trans. Ent. Soc., Lond., 1863, p. 598.

Wataikwa River.

Family COREIDAE.

Genus PTERNISTRIA.

Pternistria, Stål, En. Hem., iii, p. 39 (1873).

Type *P. macromera*, Guér.

Pternistria femoralis, sp. n. (Plate XLIX, fig. 2.)

Black; head, pronotum, scutellum and corium more or less finely ochraceously pilose; membrane piceous, opaque; antennae, rostrum,

antenniferous tubercles, anterior and intermediate legs, and the posterior tarsi ochraceous; antennae with the first and second joints subequal in length, third shortest, fourth longest; head above obscurely punctate, shortly, transversely depressed in front of the ocelli; pronotum wrinkled and punctate, the lateral margins before the lateral angles finely crenulate, the latter subacutely produced; scutellum transversely wrinkled; corium very finely and somewhat obscurely punctate; membrane shortly passing the abdominal apex; rostrum not quite reaching the intermediate coxae; in male, second abdominal segment with two central very prominent long, robust, slightly curved tubercles, a long, slightly curved spine on the lateral areas of the second and third abdominal segments; posterior femora in ♂, thickened, strongly curved, convexly produced beneath behind middle, and prominently broadly toothed near apex; the convexly produced portion has its edge coarsely dentate; posterior tibiae flattened and dilated on both sides, more so outwardly than inwardly, two apical teeth on inner and a smaller curved tooth at apex of outer area, the latter more dilated and rounded on the apical third.

Long. ♂ 19 to 20 millim.

Mimika River.

Allied to *P. macromera*, Guér., but differing by the long and robust spines to the abdomen beneath in ♂, and also by the different structure of the posterior femora.

Genus Mictis.

Mictis, Leach, Zool. Misc., i, p. 92 (1814).

Type *M. profana*, Fabr.

Mictis militaris, sp. n. (Plate XLIX, fig. 5.)

Black; two central longitudinal fasciae to pronotum—not reaching the anterior area—broad longitudinal streaks to clavus, apical margin of corium, connexivum above and beneath, a large spot on each lateral area of pro- meso- and metasterna, base of intermediate femora, and posterior femora excluding apices, dull sanguineous; antennae with the first, second and third joints black, fourth joint dull ochraceous with its base narrowly black, first joint longest, a little longer than second, third and fourth shortest and subequal in length; head above finely obscurely punctate, centrally, shortly impressed, near apex; pronotum thickly punctate, except on anterior area, the lateral margins crenulate; scutellum strongly, transversely wrinkled; corium thickly somewhat finely punctate; membrane—excluding base—shining cupreous.

♀. Posterior femora finely crenulate on inner margin and with a

short tooth before apex ; posterior tibiae thickly finely crenulate on interior edge and moderately dilated on basal half.

Long. ♀ 29 millim.

Wataikwa River.

Belonging to that section of the genus which comprises *M. limbativentris*, Stål, and *M. aruana*, Dist.

Priocnemicoris flaviceps.

Nematopus flaviceps, Guér., Voy. Coq. Ins., p. 177, pl. xii, fig. 10 (1830).

Mimika River.

Pendulinus lutescens.

Pendulinus lutescens, Dist., Ann. Mag. Nat. Hist. (8), vi, p. 581 (1911).

A somewhat discoloured specimen collected by Mr. Wollaston at Mimika River, I cannot separate from *P. lutescens* described from Queensland. It is larger in size, its length, ♀, being 14½ millim.

Marcius generosus.

Marcius generosus, Stål, Ann. Soc. Ent. Fr., 1865, p. 186.

Mimika River.

Family PYRRHOCORIDAE.

Ectatops gracilicornis.

Ectatops gracilicornis, Stål, Berl. ent. Zeitschr., vii, p. 396 (1863).

Mimika River.

Melamphaus circumdatus.

Melamphaus circumdatus, Walk., Cat. Het., vi, p. 16 (1873).

Mimika River.

Dindymus pyrochrous.

Dysdercus pyrochrous, Boisd., Voy. Astrol. Ent., ii, p. 642, pl. xi, fig. 9 (1835).

Mimika River.

Dindymus decisus.

Dindymus decisus, Walk., Cat. Het., vi, p. 5 (1873).

Mimika River.

Family ARADIDAE.

Barcinus polyacanthus.

Crimia polyacantha, Walk., Cat. Het., vii, p. 17 (1873).
Barcinus polyacanthus, Dist., Ann. Mag. Nat. Hist. (7), ix p. 359 (1902).

Mimika River.

Barcinus is allied to the genus recently proposed by Banks, *Acantharades* (Phil. Journ. Sci., iv, p. 580, pl. xi, fig. 8, 1909). It therefore seems strange that Bergroth (Ann. Soc. Ent. Belg., 1911, p. 186) should say that *Acantharades* was very closely allied to the neotropical genus *Dysodius*. More strangely still, Bergroth says that the Malayan species *D. quaternarius*, which he described in that American genus, is the same, and takes precedence over the *A. giganteus*, Banks. Both these species have been figured by the respective describers, and a reference to the figures will at once show the great dissimilarity in the structure of the head. Banks describes the head in his genus as "juga porrect, stylate, passing tylus by its own length," and this character, clearly shown in his own figure, is absent in that given by Bergroth.

Meziva membranaceus.

Aradus membranaceus, Fabr., Syst. Rhyng., p. 118 (1803).
Aradus lugubris, Boisd., Voy. "Astrolabe" Ent., ii, p. 642, pl. xi, fig. 24 (1835).

Mimika River.

Family REDUVIIDAE.

Oncocephalus annulipes.

Oncocephalus annulipes, Stal, Öfv. Vet.-Ak. Förh., 1855, p. 44.

Mimika River.

Sphedanolestes verecundus.

Reduvius verecundus, Stål, Ann. Soc. Ent. Fr., 1863, p. 38.

Mimika River.

Euagoras dorycus.

Zelus dorycus, Boisd., Voy. Astrol. Ins., ii, p. 645, pl. xi, fig. 21 (1835).

Mimika River.

Genus Pristhesancus.

Pristhesancus, Amy. and Serv., Hist. Hém., p. 360 (1843).

Type *P. dorycus*, Boisd.

Pristhesancus inconspicuus, sp. n. (Plate XLIX, fig. 1, 1*a*.)

Head, pronotum, scutellum, sternum and legs black, more or less greyishly pilose; apex of scutellum testaceous; corium pale ochraceous, the basal angle, extreme apical angle and a few irregular transverse suffusions, black; membrane hyaline, longly passing the abdominal apex; abdomen beneath shining, ochraceous, the first and second segments and the lateral margins bluish-black, the sublateral margins more or less suffused with piceous; antennæ pitchy-brown, first joint a little longer than the anterior femora; head with the post-ocular distinctly longer than the ante-ocular area; first joint of rostrum distinctly shorter than the second; pronotum with the anterior lobe sculptured and with two prominent discal tubercles, posterior lobe with the lateral angles distinctly produced, their apices tuberculously spinous, the posterior angles a little lobately and somewhat tuberculously produced; scutellum with the disc distinctly, tuberculously, erectly produced, the apex slightly, tuberculously recurved.

Long. incl. membr., 22 millim.

Wataikwa River.

Genus Helonotus.

Helonotus, Amy. and Serv., Hist. Hém., p. 361 (1843).

Type *H. tuberculatus* Guér.

Helonotus versicolor, sp. n. (Plate XLIX, fig. 3, 3*a*.)

Head, pronotum, scutellum and sternum, testaceous, longly, greyishly pilose; corium bluish-black, the clavus and subclaval area dull reddish, the apical marginal area pale ochraceous; membrane shining hyaline, considerably passing the abdominal apex; rostrum, legs and abdomen beneath, black; coxæ and last two segments of the abdomen, testaceous; head longer than pronotum, post-ocular longer than ante-ocular area; antennæ testaceous, first joint as long as anterior femora; pronotum with the anterior lobe robustly bituberculate, posterior lobe with two moderately raised discal tubercles, less prominent than those on the anterior lobe, the lateral angles spinously tuberculously produced, their apices a little directed backwardly, their posterior angles moderately lobately produced; scutellum with the disc, obliquely, upwardly, tuberculously produced, the apex also tuberculously

upturned ; rostrum with the first joint distinctly shorter than the second ; abdomen beneath thickly, shortly, greyishly pilose ; connexivum black, its outer margin on basal area, testaceous.

Long. incl. membr., 23 millim.

Wataikwa River.

Family PELOGONIDAE.

Mononyx mixtus.

Mononyx mixtus, Montand., Bull. Soc. Bucarest, viii, p. 404 (1899).

Mimika River.

Mononyx laticollis.

Mononyx laticollis, Guér., Rev. Zool., 1843, p. 114.

Mimika River.

Suborder HOMOPTERA.

Family CICADIDAE.

Cosmopsaltria doryca.

Cicada doryca, Boisd., Voy. Astrol., ii, p. 609, pl. x, fig. 3 (1835).

Mimika River.

Diceropyga obtecta.

Tettigonia obtecta, Fabr., Syst. Rhyng., p. 35 (1803).

Mimika River.

Bacturia conviva.

Cicada conviva, Stål, Stett. ent. Zeit., xxii, p. 152 (1861).

Mimika River.

Bacturia exhausta.

Cicada exhausta, Guér., Voy. Coq. Ins., p. 181, pl. x, fig. 6 (1830).

Mimika River.

Lembeja crassa.

Lembeja crassa, Dist., Tr. Ent. Soc. Lond., 1909, p. 395, pl. x, fig. 7.

Mimika River.

Family FULGORIDAE.

Aphaena reversa.

Ulasia reversa, Walk., Journ. Linn. Soc. Zool., x, p. 99 (1870).

Mimika River.

Myrilla obscura, var.

Myrilla obscura, Dist., Trans. Ent. Soc. Lond., 1888, p. 487, pl. xiii, fig. 8.

Mimika River.

This variety differs from the type in having less than basal two-thirds of the wings, black.

Myrilla papuana.

Myrilla papuana, Dist., Ann. Mag. Nat. Hist. (7), xviii, p. 29 (1906).

Mimika River.

Paricana curvifera.

Paricana curvifera, Dist., Ann. Mag. Nat. Hist. (7), xix, p. 288 (1907).

Wataikwa River.

OKENANA, gen. nov.

Head including eyes as wide as the anterior angles of the pronotum; vertex transverse slightly convex, the anterior lateral angles subprominent; face scarcely longer than broad, narrowing from middle to clypeus, centrally longitudinally carinate, the lateral margins laminately reflexed; clypeus with two longitudinal ridges on basal area; pronotum and mesonotum centrally longitudinally carinate; tegmina about one and a half times as long as broad, costal membrane not wider than radial area, the first obliquely, the latter more transversely veined, claval area strongly granulose; wings about one and a half times as long as broad, posterior margin distinctly sinuate near middle, some of the longitudinal veins furcate outwardly and forming apical cells; posterior tibiae bispinose, one spine beyond middle, the other at apex.

Somewhat allied to *Halavrita*, but differs in the clypeus having two longitudinal ridges on the basal area.

Okenana lycaena, sp. n. (Plate XLIX, fig. 8, 8*a*.)

Body, tegmina and wings dark cerulean blue, more or less greyishly tomentose; abdomen tinged with ochraceous; tegmina with the costal membrane, radial area, clavus, and apical area more distinctly greyishly tomentose.

Long. excl. tegm. 6 millim. Exp. tegm. 19 millim.

Wataikwa River.

Ricania binotata.

Ricania binotata, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 149 (1870).

Mimika River.

Euricania splendida.

Ricania splendida, Guér., Voy. Coquille Ins., p. 191, pl. x, fig. 10 (1830).

Mimika and Wataikwa Rivers.

Varcia sordida.

Varcia sordida, Dist., Ann. Mag. Nat. Hist. (8), iv., p. 336 (1909).

Mimika River.

Family MEMBRACIDAE.

Genus Ibiceps.

Ibiceps, Buckt., Mon. Membrac., p. 238 (1903).

Type *I. falcatus*, Buckt.

Ibiceps alticeps.

Centrotus alticeps, Walk., Journ. Linn. Soc., x, p. 183 (1867).

Mimika River.

Genus Sarantus.

Sarantus, Stål, Trans. Ent. Soc. Lond. (3), i, p. 592 (1863).

Type *S. wallacei*, Stål.

Sarantus wallacei.

Sarantus wallacei, Stål, Trans. Ent. Soc. Lond. (3), i, p. 592 (1863).

Mimika River.

Family CERCOPIDAE.

Aufidus hilaris.

Aufidus hilaris, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 291 (1867).

Wataikwa River.

Cosmoscarta sequens.

Cercopis sequens, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 285 (1867).

Wataikwa River.

Cosmoscarta discolor.

Cercopis discolor, Boisd., Voy. Astrol. Ent., p. 619, pl. x, fig. 11 (1835).

Wataikwa River.

Cosmoscarta divisa.

Cercopis divisa, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 279 (1867).

Mimika River.

Cosmoscarta mimikensis, sp. n. (Plate XLIX, fig. 10.)

Body shining black; disc of head from apex to between ocelli, and disc of face ochraceous; apex of abdomen sanguineous; femora piceous, their apices and the tibiae and tarsi dull sanguineous; tegmina shining black, with five prominent ochraceous spots, one near base and another near apex of costal membrane, one (largest) at base and another near apex of clavus, above the last the fifth spot is situate; wings somewhat pale piceous, their extreme bases obscurely ochraceous; pronotum with a central longitudinal carination which neither quite reaches base nor apex, the lateral margins broadly moderately reflexed, the whole surface thickly finely punctate and slightly wrinkled; scutellum distinctly foveate near base and then distinctly centrally ridged to apex; face prominent and compressed, centrally broadly impressed, the lateral areas strongly transversely striate; posteror tibiae with a long robust spine a little beyond middle.

Long. excl. tegm. 14 millim. Exp. tegm. 40 millim.

Mimika River.

Cosmoscarta wataikwensis, sp. n. (Plate XLIX, fig. 11.)

Head, pronotum, scutellum and body beneath, black; apex of head, central disc of face, metasternal spots, rostrum, legs, abdomen above, and tegmina purplish-red, apical areas of the latter piceous; wings fuliginous, their extreme bases purplish-red; pronotum thickly finely punctate and slightly wrinkled, the posterior half centrally longitudinally carinate, lateral margins slightly reflexed; scutellum strongly transversely striate; posterior tibiae with a prominent, robust spine beyond middle and a very short spine near base; mesosternum bituberculate.

Long. excl. tegm. 16 millim. Exp. tegm. 42 millim.

Wataikwa River.

Family JASSIDAE.

Tettigoniella inconspicua. (Plate XLIX, fig. 9.)

Tettigonia inconspicua, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 303 (1867).

By a singular oversight Walker omitted to describe the tegmina of this species, which happens superficially to be the most striking character. The tegmina from base to commencement of apical cells are testaceous, with a large, irregular, transverse, greyish, tomentose spot beyond middle, the apical cellular area is dull fuliginous, piceous at the inner angle beyond clavus; the whole costal margin is very narrowly bluish-black.

Wataikwa River.

Tettigoniella vittifrons.

Tettigonia vittifrons, Walk., Journ. Linn. Soc. Lond. Zool., x, p. 302 (1867).

Wataikwa River.

Tartessus sananas, sp. n. (Plate XLIX, fig. 7, 7*a*.)

Head, pronotum, and scutellum ochraceous; abdomen above, body beneath and posterior legs black or piceous; head beneath ochraceous; a curved fascia between the eyes, central longitudinal disc of face, a short curved fascia behind each eye, and disc of clypeus black; anterior and intermediate legs and apical areas of posterior tibiae (excluding extreme apices), ochraceous; tegmina shining fuliginous, costal membrane and veins black or piceous, claval vein brownish-ochraceous; wings pale fuliginous, apical area distinctly

darker, veins blackish; pronotum finely transversely wrinkled, somewhat conically produced anteriorly; scutellum with an obsolete, central, longitudinal carination; abdomen shortly finely pilose; spinules of posterior tibiae long and robust.

Long. excl. tegm. ♀ 11 millim. Exp. tegm. 23 millim.

Mimika River.

Allied to *T. ferrugineus*, Walk., and by the facial markings to *T. scabrifrons*, Walk.

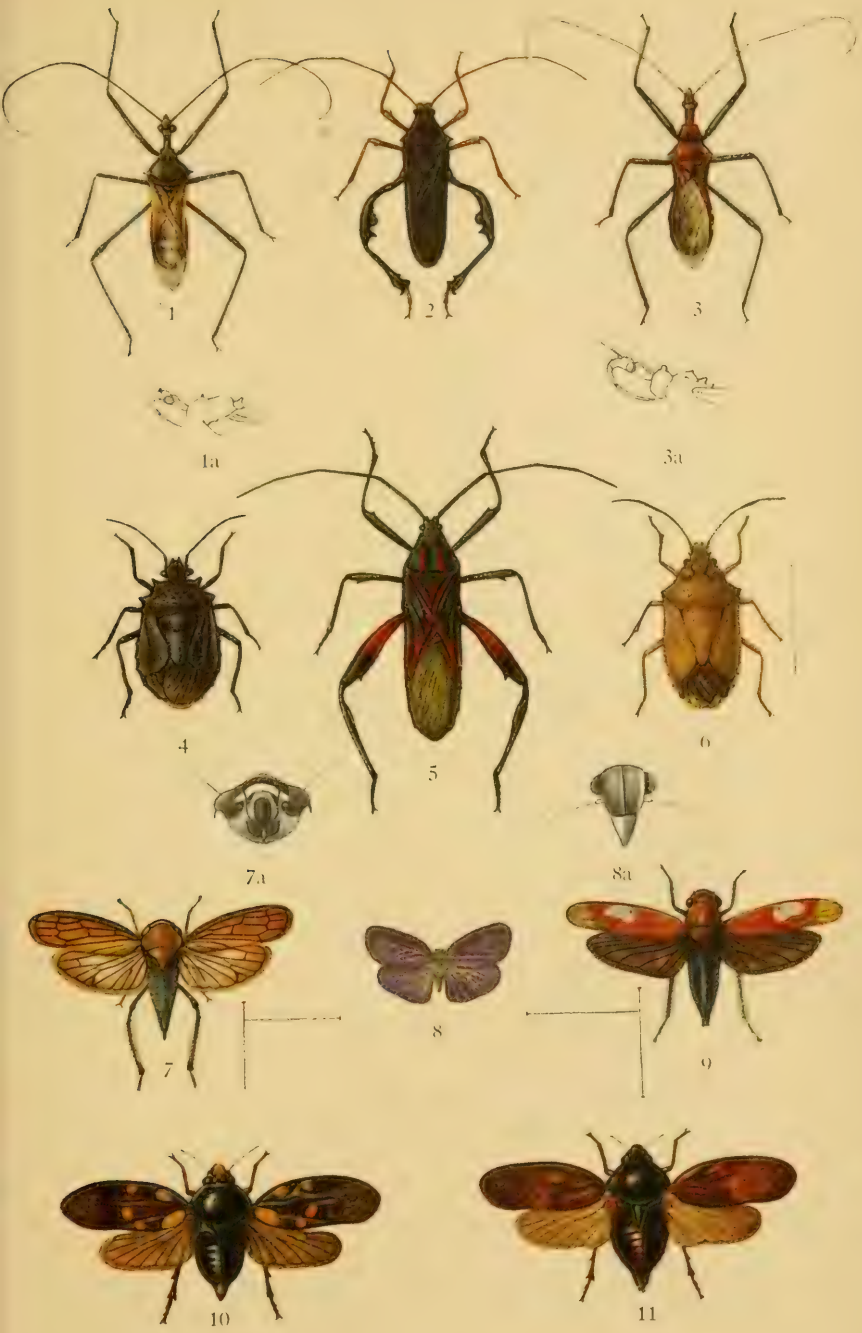
Explanation of Plate XLIX.

[*See Explanation facing the* Plate.]

Explanation of Plate XLIX.

Fig.

1, 1*a*. *Pristhesancus inconspicuus*, sp. n., p. 598.
2. *Pternistria femoralis*, sp. n., p. 594.
3, 3*a*. *Helonotus versicolor*, sp. n., p. 598.
4. *Mimikina wollastoni*, gen. n., sp. n., p. 593.
5. *Mictis militaris*, sp. n., 595.
6. *Elamana propria*, gen. n., sp. n., p. 594.
7, 7*a*. *Tartessus sananus*, sp. n., p. 603.
8, 8*a*. *Okenana lycaena*, gen. n., sp. n., p. 601.
9. *Tettigoniella inconspicua*, Walk., p. 603.
10. *Cosmoscarta mimikensis*, sp. n., p. 602.
11. ,, *wataikwensis*, sp. n., p. 603.



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RHYNCHOTA FROM NEW GUINEA.

XXVII. *Report on a collection of* Bombyliidae (Diptera) *from Central Africa, with description of new species, by* Prof. Mario Bezzi, *Turin, Italy.*

[Read October 4th, 1911.]

Plate L.

Through the kindness of Mr. Guy A. K. Marshall, the Scientific Secretary of the African Entomological Research Committee, I have received for study a very interesting collection of Bombyliids from Tropical Africa. Some of these beautiful flies, which may be called the butterflies of the Diptera, are of economic importance on account of their parasitic habits, for the larvae of several species are known to prey on the egg-cases of locusts.

The genera in the collection may be tabulated as follows :—

1 (10). Hind margin of the eyes absolutely entire, not indented and without a deep sinuosity ; proboscis always long.

2 (9). First posterior cell of the wings closed.

3 (6). Upper basal cell longer than the second one.

4 (5). First posterior cell closed long before the hind margin of the wings ; basal comb of the wings distinct *Bombylius*, p. 606.

5 (4). First posterior cell closed very near the hind margin and strongly pointed at the end ; no basal comb at the root of the costal vein . . . . *Sisyrophanus*, p. 611.

6 (3). The two basal cells of equal length.

7 (8). Face prominent, moderately pilose ; discal cell as in *Bombylius* . . . . . *Systoechus*, p. 607.

8 (7). Face not prominent, densely pilose ; discal cell very obtuse at the end ; its apical cross-vein as long as the width of the first posterior cell at the same point . *Anastoechus*, p. 609.

9 (2). First posterior cell open ; basal comb of the wings not developed . . . . . *Dischistus*, p. 610.

10 (1). Hind margin of the eyes indented or deeply sinuose.

11 (12). Hind margin of the eyes deeply sinuose ; third antennal joint hairy above ; proboscis long ; first posterior cell as in *Sisyrophanus* . . . . *Eurycarenus*, p. 613.

12 (11). Hind margin of the eyes indented ; proboscis usually short.
13 (14). Second longitudinal vein issuing from the third at an acute angle far before the first cross-vein ; first cross-vein far behind the middle of the discal cell . *Lomatia*, p. 613.
14 (13). Second longitudinal vein issuing at a right angle opposite or nearly opposite the first cross-vein; if far before, the angle is never acute.
15 (18). Second longitudinal vein issuing from the third some distance before the first cross-vein, at least at a distance which is greater than the distance of the cross-vein itself.
16 (17). Two submarginal cells . . . *Petrorossia*, p. 615.
17 (16). Three submarginal cells ; anal cells broadly open ; wings petiolate ; proboscis long . *Isotamia*, gen. n., p. 627.
18 (15). Second vein issuing opposite or nearly opposite the first cross-vein, the distance at any rate being smaller than the length of the cross-vein itself.
19 (22). Antennal style with a pencil of hairs at the tip ; genitalia of the male of somewhat larger size, symmetrical.
20 (21). Third antennal joint lenticular, with a projecting margin; abdomen with silvery spots ; wings obliquely bordered with black on the anterior half . . *Anthrax*, p. 620.
21 (20). Third antennal joint not so shaped ; abdomen with scales ; wings clear with some brown spots *Molybdamoeba*, p. 617.
22 (19). Antennal style without pencil of hairs; genitalia of the male smaller, unsymmetrical.
23 (26). Two submarginal cells only.
24 (25). Face rounded ; wings clear, at most only blackened on the fore margin . . . . . *Villa*, p. 623.
25 (24). Face prominent; wings with extensive dark or black markings . . . . . *Thyridanthrax*, p. 625.
26 (23). Three or four submarginal cells.
27 (30). Three submarginal cells.
28 (29). Face conically produced; proboscis short *Exoprosopa*, p. 635.
29 (28). Face rounded; proboscis long . *Litorrhynchus*, p. 629.
30 (27). Four submarginal cells . . . *Hyperalonia*, p. 651.

1. *Bombylius*, Linnè (1758).

Two species only, belonging to two distinct groups.

1. *Bombylius micans*, Fabricius (1798).

A male specimen of this well-known South African species from Nyika Plateau, Urongo stream, North Nyasa, July 14th, 1909 (*Dr. J. B. Davey*).

2. *Bombylius ornatus*, Wiedemann (1828).

Fifteen specimens of both sexes of this common African species, Songwe River, North Nyasa, June 21, 1909; near mouth of River Rumpi, May 12, 1909; Mwenetete village, Songwe River, June 21, 1909, round cattle (2 ♂, 2 ♀); Florence Bay, November 1, 1909; Deep Bay, October 31, 1909; Marimba, Ukasi village, January 15, 1910 (all from *Dr. J. B. Davey*). Mzimba West Nyasa, May and June 1909 (*Dr. H. S. Stannus*).

2. *Systoechus*, Loew (1855).

This genus, which is of economic importance, is well represented in the collection by numerous specimens belonging to five different species. The larvae live in the egg-cases of locusts, as observed in N. America by Riley (*S. oreas* preying on *Oedipoda atrox*) and in Europe by Stepanoff, Schimkewitch and Portschinsky (*S. autumnalis* and *leucophaeus* on *Stauronotus maroccanus*).

The species before me can be distinguished as follows:—

1 (2). Femora wholly black; abdomen with very few black bristles; wings tinged at the base with dark brown or blackish.
albidus, Loew.

2 (1). Femora wholly yellow or black at the base only; abdomen with or without bristles; wings wholly clear or with a brownish or yellowish tinge at the base.

3 (6). Abdomen without black bristles at the hind margin of the segments; femora wholly yellow.

4 (5). Eyes of the male separated; face with yellow hairs; hind femora with black spines; wings broadly infuscated at the base . . . . . *robustus*, sp. n.

5 (4). Eyes of the male touching; face with black hairs; hind femora with yellow spines; wings clear at the base.
simplex, Loew.

6 (3). Abdomen with black bristles at the hind margin of the segments.

7 (8). Face with black hairs; hind femora with yellow bristles
melampogon, sp. nov.

8 (7). Face with yellow hairs; hind femora with black bristles
ctenopterus, Mikan.

3. *Systoechus albidus*, Loew (1860).

The abdomen of this species bears very few black bristles, the most of these being whitish. I think that

S. nigripes, Loew (1863), from the Cape is the same species, and both are very closely allied to the European *S. leucophaeus*, Meigen. The species is known from South and West Africa; in the collection are seven specimens of both sexes from West Nyasa, Mzimba, May and June 1909 (*Dr. H. S. Stannus*).

4. *Systoechus robustus*, sp. nov. (Plate L, fig. 1.)

♂ ♀. Length (3 specimens) 13 to 14 mm.; proboscis 8 to 8½ mm. A very robust species, easily distinguished by the short and dense yellowish pubescence of the body, there being no black hairs or bristles whatever on the thorax and abdomen.

Eyes of the male somewhat widely separated, the front of the female being twice as wide as that of the male; the median frontal furrow very little developed; all the hairs of head yellowish; antennae black, the third joint very thin in the apical third, where it is yellow; terminal style very minute; proboscis black, 10 mm. long; ground colour of the head black, the sides of the mouth yellow. Thorax densely clothed with short greyish hairs, those on the sides being a little paler; prealar bristles whitish; scutellum dark red. Squamae brownish, with a dense fringe of white hairs; halteres white. Abdomen black, but in the male the sides and the hind margins of the segments are reddish; the pubescence as on the thorax; bristles wanting. Legs wholly reddish-yellow, only the trochanters and the last tarsal joints being black; with scanty whitish tomentum; all the bristles black, those of the hind femora very strong. Wings somewhat greyish, with a reddish-brown tinge on the basal portion, which extends from the end of the first vein obliquely to the basal cross-veins and to the middle of the anal cell. Basal comb strong, black; veins mostly rufous, the first bright red; second and third longitudinal veins closely approximated till the middle of the first posterior cell.

This species seems to be allied to *S. ferrugineus*, Macq. (1834), from Senegal.

Type ♂, North Nyasa, on the road from Karonga to Fort Hill, near Chikwete's village, May 21, 1909 (*Dr. J. B. Davey*). Type ♀, W. Nyasa, Mzimba, May 1909 (*Dr. H. S. Stannus*). Another male specimen, in poor preservation and denuded, from the same locality as the female type.

5. *Systoechus simplex*, Loew (1860).

The species is known from South and East Africa.

In the collection are two specimens which I refer with

great doubt to this species. A male from North Nyasa, Wovwi River, December 24, 1909 (*Dr. J. B. Davey*); the eyes touching. A female, wholly denuded, from North Nyasa, October 1909 (*Dr. H. S. Stannus*).

6. *Systoechus melampogon*, sp. nov.

♂ ♀. Length (6 specimens) 7 to 9 mm.; length of proboscis 4 to 4½ mm.

Near *S. mixtus*, Wied., but smaller and with black hairs on the face and hyaline wings. Head black, produced; eyes of the ♂ very closely approximated, but not touching; frons and face in the ♂ with the hairs entirely black, in the ♀ with some yellow hairs intermingled on the frons and upper portion of the face. Antennae black, the third joint not attenuated; terminal bristle small, the basal joint not distinct as in *S. mixtus*. Proboscis black, short. Ground colour of thorax velvety black in the male, less velvety in the female; it is densely clothed with erect, dark yellowish hairs of equal length, without black bristles; sterna and pleura with similar hairs; the hairs in the female are of a paler tint. Halteres whitish; squamae brown with yellow hairs. Scutellum dark red, black at the base and in the middle. Abdomen black, sometimes reddish at the sides; the hairs are of the same colour as on the thorax; black bristles well developed. Legs yellow, the basal part of the femora a little blackened in the male: coxae and trochanters black; tarsi black at tip; the pubescence and hairs are white, the bristles yellow, also those on the hind femora. Wings wholly hyaline, with a small yellowish patch at the base; veins brown, the first black; basal comb small, mostly yellow, with a few black bristles.

Type ♂ and two other specimens from Southern Nigeria, Oshogbo, February 27 and 28 (*J. J. Simpson*). Type ♀ and another specimen from the same locality and taken by the same collector, February 28, 1910, and March 1, 1910; another ♂ from North Nyasa, Fort Hill, October 26, 1909 (*Dr. J. B. Davey*).

7. *Systoechus ctenopterus*, Mikau (1796).

A single ♀ specimen from North Nyasa, on the road from Karonga to Fort Hill, near Lufira River, May 30, 1909 (*Dr. J. B. Davey*), which agrees very well with our South European specimens.

3. *Anastoechus*, Osten-Sacken (1877).

This genus has not been previously recorded from Tropical Africa; the species have the same habits and importance as those of the preceding genus.

8. *Anastoechus meridionalis*, sp. nov.

♀. Length 10 mm.

Very near *A. nitidulus* and *hyrcanus*, but with very different antennae. Hairs on the upper side of the body greyish yellow, on the ventral side white. Head with white hairs, except those on the frons, which are black on the upper and yellowish on the lower portion. Antennae with the two basal joints red; the third black, not constricted at the base and tapering into a long point. Scutellum dark red. Squamae whitish and white-fringed; halteres yellowish. The bristles on thorax and abdomen are yellowish. Legs yellow, with white pubescence and white hairs; femora broadly black at the base, the hind femora almost entirely black; bristles whitish yellow; tarsi darkened at tip. Wings as in *A. nitidulus*, but the first posterior cell a little larger.

Type ♀, from West Nyasa, Mzimba, August 1909 (*Dr. H. S. Stannus*); the only specimen.

This is the first *Anastoechus* recorded from the southern hemisphere; the first posterior cell is larger than in typical forms. The North African *A. retrogradus*, Becker, also has the basal joints of the antennae red.

4. *Dischistus*, Loew (1855).

Of this genus, which is represented by very numerous species in Africa, there are in the collection only two specimens, which belong in my opinion to two new species.

9. *Dischistus diadematus*, sp. nov.

♀. Length 6 mm.

A small species, readily distinguished by the two silvery spots on the sides of fore margin of the frons at the base of the antennae.

The body is clothed with golden hairs; only on the frons are there some black hairs; the bristles of thorax and abdomen are black. Head black; frons shining in the middle, with black short hairs, covered on the sides by dense golden pubescence; face clothed with wholly yellowish hairs; the silvery hairs form a transverse band (interrupted in the middle) at the insertion of the antennae; occiput with short and dense hairs. Antennae black; the basal joints very short and black-haired; third joint long, not pointed, obtuse. Proboscis black, $2\frac{1}{2}$ mm. long. Thorax and scutellum velvety black, densely clothed with golden hairs; scutellum bearing eight strong black bristles on the hind margin, those of the middle decussate. On the pleura the hairs are of a paler tinge. Halteres

yellowish. Abdomen black, clothed like the thorax; hind margins of the segments with a row of strong bristles. Legs yellow, with whitish pubescence; femora with the basal two-thirds black; tarsi darkened; bristles strong, black. Wings somewhat greyish, with a small yellowish area towards the base; basal comb not developed; the first, third and sixth veins are red; small cross-vein before the middle of discal cell; apical branch of the third vein oblique, gently curved; marginal cell dilated at the tip.

Type ♀, from Southern Nigeria, Benin City, March 20, 1910 (*J. J. Simpson*); a single damaged specimen.

10. *Dischistus hirtus*, sp. nov.

♀. Length 10 mm.

Very near *D. capito*, Loew, but with black legs; distinguished from *D. seriatus*, Wied., by the hyaline wings.

Hairs of the body very long, yellowish, but with some black hairs intermingled. Frons clothed with short yellow hairs and very long black ones; occiput with very long yellow hairs, a few black near the vertex; face with long hairs which are yellow, with some black towards the sides. Antennae black, the basal joints with very long black hairs; third joint a little attenuated in the apical half. Proboscis black, 4½ mm. long. Thorax and scutellum greyish black, with long hairs which are yellow and black intermingled; scutellum with marginal hairs only, without bristles; pleurae without black hairs. Halteres orange-yellow, abdomen clothed like the thorax, the hind margin of segments with numerous erect, but not strong, black bristles. Wings pure hyaline, with black veins, and no basal comb; small cross-vein placed on the last third of the discal cell; marginal cell not dilated; anterior branch of the third vein very long, bent in the middle. Legs wholly black, with whitish pubescence and hairs and with black bristles.

Type ♀, from North Nyasa, Misuko Plateau, feeding on flowers, June 2, 1909 (*Dr. J. B. Davey*); a single specimen.

5. *Sisyrophanus*, Karsch (1886).

A very distinct genus, of which only a single species, *S. homeyeri*, Karsch, from Pungo Andongo, is known at present; a figure of this species is to be seen on page 54 of the "Entom. Nachricht.," vol. xii. The author places his genus near *Eurycarenus*, which it certainly resembles in the form of the first posterior cell. But as the eyes are absolutely entire on the hind margin, I think that

Sisyrophanus has more affinity with *Dischistus*, notwithstanding the closed first posterior cell. The South African fauna is rich in species of *Dischistus*, which have an elongated cylindrical body, and this is to be seen also in the species of *Sisyrophanus*.

In the collection are represented two species, which are both different from *S. homeyeri* and very distinct.

11. *Sisyrophanus leptocerus*, sp. nov.

♂. Length 11 mm.

A species near *S. homeyeri*, but with black femora, wholly black abdomen and wholly hyaline wings.

Head black; face shining black, strongly and conically produced, bare in the middle, with long pale hairs on the sides; eyes touching for a considerable distance; ocellar tubercle with some black hairs; on the occiput and below the hairs are greyish. Antennae black; the first joint shining, swollen; the second opaque; these two joints bear below some strong and long black and white hairs; third joint opaque, as long as the first two together, much narrower than the first, attenuated at the tip, without distinct terminal style. Proboscis black, 5 mm. long. Upper facets of the eyes distinctly enlarged. Beard dense, white. Hairs of the thorax dense, short, greyish on the upper side, white below; thorax and scutellum black, without black hairs or bristles. Halteres yellowish; squamae with white fringe. Abdomen black, clothed with hairs like those on the thorax; hind margin of the segments with a row of long black hairs. Legs black, the tibiae dark reddish; bristles of the tibiae black; hind femora without bristles, with a few white hairs only. Wings pure hyaline, with a small yellowish area towards the extreme base; veins yellowish; costal cell dilated at the tip; anterior branch of third vein very sinuose; small cross-vein beyond the middle of the discal cell; anal cell widely open; first posterior cell very pointed at the end.

Type ♂, from Mbwabwa, Momberas, May 1909 (*Dr. H. S. Stannus*); a single specimen, not in very good condition.

12. *Sisyrophanus pyrrhocerus*, sp. nov.

♀. Length 9 mm.

A smaller and more cylindrical species, very distinct on account of the bright red third antennal joint and the yellow legs.

Frons wide, shining black, with a grey band at the base of the antennae and some erect black hairs; face very prominent, black, very shiny, with a small yellowish spot at the posterior, lateral

margin of the mouth, bare, with very scanty greyish hairs on the sides. Antennae with the first two joints black, the first swollen but short, bearing short black hairs; the third joint longer than the first two together, and not narrower, of a bright red colour and showing a very minute terminal style. Proboscis black, thin, 5 mm. long. Occiput with long and dense lemon-yellow hairs. Thorax and scutellum black, clothed with long lemon-yellow hairs, without black hairs. Halteres whitish. Abdomen black, with the same hairs as on the thorax, with only a few black hairs on hind margin of segments. Genitalia yellow-red, with long red spines. Legs yellow, with only the coxae and tarsi black; tibiae with yellow bristles; femora with pale hairs, those of the hind pair without bristles. Wings pure hyaline, with black veins, which are reddish at the base, costa and first veins wholly reddish; direction of the veins the same as in the preceding.

Type ♀, and another specimen, from West Nyasa, Mzimba, June 6, 1909 (*Dr. H. S. Stannus*).

6. *Eurycarenus*, Loew (1860).

A very distinct African genus, which seems to be allied to the South American *Heterostylum*, Macq.; at least both genera show the same sinuosity at the hind margin of the eyes. Only a single species is known, which has however, a wide distribution in the Ethiopian region. *E. pachyceratus*, Bigot (1892), from the Cape, is very doubtful, and belongs perhaps to the preceding genus.

13. *Eurycarenus laticeps*, Loew (1852).

Several specimens of this easily recognised species from West Nyasa, Chintechi (*Dr. H. S. Stannus*); another male specimen from Northern Nigeria, Lokoja, January 10, 1911 (*J. J. Simpson*); a very small female (7 mm.) is from Abu Jill, Kordofan (*H. H. King*).

7. *Lomatia*, Meigen (1822).

Of this distinct genus, which is abundantly represented in the Ethiopian fauna, there are in the collection only two specimens, belonging to two very different species.

14. *Lomatia inornata*, Loew (1854—not of 1860!).

Loew has described two different species of *Lomatia* with this same name: one in 1854 from Nubia, and another in 1860 from South Africa. Since the two

species are certainly different, that of 1860 must be re-named *Lomatia loewi*, nom. nov.

The single specimen in the collection, taken at Vitiya, West Nyasa, October 1910 (*Dr. H. S. Stannus*), seems to belong to the species of 1854; but the determination is very doubtful. The indentation of the hind margin of the eyes is very obsolete.

15. *Lomatia gigantea*, sp. nov. (Plate L, fig. 2.)

♂. Length of the body 15 mm., of the wing 17 mm.; wing-expanse 37 mm. General appearance as in our species of the group of *L. belzebul*. Belongs to Division I B of Loew, near *L. pictipennis*, Wied., but of much larger size and with very different wing-markings. The size is about the same as that of *L. longitudinalis*, Loew, which has, however, yellow legs.

Ground colour of head, body, antennae and legs black. Occiput clothed with grey tomentum and yellow pubescence; face and frons with long golden yellow hairs; ocellar tubercle and vertex with black hairs. Eyes subcontiguous, with the indentation of hind margin broad and distinct. Two first joints of the antennae with short black and yellow hairs; third joint elongate conical, a little excavated below, gradually tapering into a long style. Proboscis black, as long as the head. Thorax on dorsum clothed with olive-brown tomentum, which is grey on the pleurae and below; the hairs are dense and golden yellow, greyish on the pleurae, with whitish tufts on meso- and sterno-pleura; the bristles are yellow. Squamae pale yellowish with white fringe; halteres yellowish. Abdomen with entire transverse bands of golden tomentum at the hind margin of each segment; first segment clothed with long hairs, which are yellow dorsally and white ventrally; the hairs on the sides of the other segments are also long and paler; underside with short grey pubescence. Genitalia not prominent, dark reddish, black above, shining. Legs with golden yellow pubescence and black bristles; on the four anterior tibiae the pubescence is whitish. Wings very long; the markings about as in *L. pictipennis*, but the colour yellowish and not brown; there is a dark marking along the first basal cell and around the small cross-vein and its vicinity; on the marginal, submarginal and discoidal (including the second basal) cells are longitudinal stripes of a pale yellowish tinge. No distinct pre-apical brown band; the hind margin of the wing is hyaline throughout its whole length, as is also the apex. Direction of wing veins as in Loew's pl. II, fig. 12, but the first posterior cell is not so narrowed at its end.

Type ♂, from Nyasaland, Blantyre, May 3, 1910 (*Dr. J. E. S. Old*); a single specimen.

8. *Petrorossia*, Bezzi (1908).

This genus was erected by me for the well-known Mediterranean *Argyramoeba hesperus*, and is included in the monograph of Dr. Sack (1909), with this species alone. I am now very glad to find that it is well represented in Africa, as the collection comprises no fewer than four distinct species.

The genus is easily distinguishable from any of its allies; it most closely resembles *Chionamoeba*, Sack, from which it differs chiefly in the form of the discal cell and in the origin of the second longitudinal vein.

The species before me can be distinguished as follows:—

1 (4). Species more robust and of greater size, without golden tomentum on thorax, scutellum and abdomen; frons opaque; abdomen wholly brown, or with a small yellowish marking on the sides only.

2 (3). Frons with black hairs; abdomen wholly brown, or with only a small yellowish patch at the extreme base, with black bristles on the sides; upper branch of third vein normally with a recurrent veinlet . *hesperus*, Rossi.

3 (2). Frons with white hairs; abdomen with a narrow yellowish lateral stripe along its whole length and without black bristles on the sides; upper branch without appendix *letho*, Wied.

4 (1). Smaller and delicate species, clothed with golden tomentum; abdomen orange-red, with or without a median longitudinal dark stripe; frons shining black.

5 (6). Face with white hairs; abdomen with a broad median black stripe; second longitudinal vein strongly bent near the apex; upper branch of the third vein bent at an angle and here with an appendix; anal cell narrowly open *fulvipes*, Loew.

6 (5). Face with black hairs; abdomen without median stripe; second vein slightly curved, as also the upper branch of the third, which is without appendix; anal cell widely open . . . . . *gratiosa*, sp. n.

16. *Petrorossia hesperus*, Rossi (1790).

A single female of great size (length 10 mm.), from N. Nyasa, on the road from Karonga to Fort Hill, near Kaseye, June 1, 1909 (*Dr. J. B. Davey*), which agrees very well with our Italian specimens. The femora are wholly yellow, and there is no appendix to the upper branch of the third vein; the wings are hyaline, and only slightly infuscated toward the fore margin.

This species seems, however, to be decidedly variable. I have in my collection 9 ♂ and 7 ♀ from Upper, Middle and South Italy, Sardinia and Corsica, Portugal, Greece and Syria. Of these specimens, ten have the appendix on the upper branch of third vein ; one has an appendix also on the inner side of the discal cell; twelve have the wings hyaline, the others infuscated ; two have the femora wholly or in greater part yellow. The female has normally the wings hyaline and the upper branch without appendix (five specimens out of seven), and the femora are more yellow.

17. *Petrorossia letho*, Wiedemann (1828).

Anthrax longitarsis, Becker (1902), from Egypt, is without doubt a synonym of this species, which seems to be widely spread in Africa. The female has no appendix at the fork of the third vein, hyaline wings and yellow femora; the male has also no appendix (but one has an appendix on the anterior angle of the discal cell), but the femora are wholly or partly black ; the wings are darkened in the basal half in two specimens and hyaline in one.

Four specimens of both sexes from North Nyasa, Akamanga, South Rukuru River, October 10, 1909, and Songwe River, September 17, 1909 (*Dr. J. B. Davey*). The species is already known from Nubia, Sahara and Alexandria.

Wiedemann records also the variable colour of the legs ; Loew in 1860 has it under *Eroprosopa*, but in the "Berlin Entom. Zeitsch.," xvi. p. 77, he says that it is a species of *Argyramoeba*, near *hesperus*.

18. *Petrorossia fulvipes*, Loew (1860).

A single male from North Nyasa, Florence Bay, February 1, 1909 (*Dr. J. B. Davey*), of this elegant species, agrees very well with Loew's description. The wings are strongly darkened on the basal half, the limit of the dark patch running obliquely from the end of the first vein to the apex of the anal cell. The appendix of the fork of the third vein is present upon one wing only.

19. *Petrorossia gratiosa*, sp. nov. (Plate L, fig. 14.)

♂. Length, 5 mm.

A very small, pretty species, allied to the preceding one, but abundantly distinct by the wholly orange-red abdomen and different venation.

Head velvety black, the frons shining in the middle, clothed with

black hairs ; face with black hairs, with only a few pale hairs intermingled. Antennae black, of the same form as in the preceding. Thorax and scutellum velvety black, covered with golden tomentum, as in the preceding ; the hairs on the pleurae, however, are of a golden colour, not white. The abdomen has only the first segment black, and is, moreover, a little darkened at the tip. Halteres yellowish. Legs wholly orange-red, the tarsi darkened, with thin black bristles. Wings evenly and slightly darkened over their entire surface. The second vein is only gently curved at the apex, without the usual strong arcuate fold ; upper branch of the third vein long, gently curved, without appendix ; discal cell long and narrow ; small cross-vein placed on the first fourth of discal cell, anal cell but little narrowed at the end.

Type ♂, from Southern Nigeria, Benin City, March 20, 1910 (*J. J. Simpson*) ; a single specimen.

9. *Molybdamoeba*, Sack (1909).

This genus is only slightly differentiated from the following one ; but the species has a particular facies, which seems to be sufficient for its distinction. In this genus is also notable the development and length of the recurrent veinlets of the wings. The wings are hyaline, with a few dark spots on the cross-veins and forks ; the tibiae are yellow. The species in the collection can be distinguished as follows :—

1 (2). Face with white hairs only ; anal cell closed
leucopogon, sp. n.

2 (1). Face mostly or predominantly black-haired ; anal cell open.

3 (4). Abdomen with very large scales towards the sides, compressed at the tip ; pubescence of the body yellowish ; genital plate of male with black fringe ; all the cross-veins on the wings infuscated . *punctipennis*, Wied.

4 (3). Abdomen without lateral patches of large scales, not compressed at the tip ; genital plate without a black fringe.

5 (6). Ground colour of body grey ; abdomen with yellow pubescence ; the yellow hairs in front of the thorax very long ; hairs on the face mostly yellowish
incisuralis, Macq.

6 (5). Ground colour black ; abdomen with the yellow pubescence very scanty ; yellow hairs in front of the thorax sparse ; black hairs predominating on the face
decipiens, sp. n.

20. *Molybdamoeba punctipennis*, Wied. (1821).

Some specimens which agree well with Loew's description; but Loew says nothing about the patches of large scales on the sides of the abdomen. The usual length is 14 mm.; but one male measures only 10 mm. The male genitalia are of large size, and wholly shining red. Black tufts of hairs on the sides of abdomen are to be found only on the second and fourth segments. The single female has the hairs on the face whitish. The wings show always the dark spot at base of the fork of the third vein.

Two males from North Nyasa, Karonga to Fort Hill, near Lufira River, May 30, 1909, and Akamanga, South Rukuru River, October 10, 1909 (*Dr. J. B. Davey*); three males and a female from Nyasaland, Fort Johnston, 2,000 ft., June 1910 (*Dr. A. H. Barclay*).

21. *Molybdamoeba incisuralis*, Macquart (1840).

Agrees very well with Loew's description of *Anthrax mixtus* (1860), which is without any doubt the same species.

Closely allied with the preceding species, but distinguished by the want of large scales on the sides of the abdomen; by the male genitalia being black at the base and without a black fringe; by the presence of black tufts of hairs also on the sides of the fifth abdominal segment; by the want of the dark spot at the base of the fork of the third vein.

Three males from North Nyasa, Mulanasasa, Nchipomi stream, September 16, 1909, and Mudumuka village, North Rukuru River, August 25, 1909 (*Dr. J. B. Davey*); a couple from Nyasaland, Fort Johnston, 2,000 ft., June 1910 (*Dr. A. H. Barclay*). Two male specimens from North Nyasa, Karonga to Fort Hill, near Lufira River, May 30, 1909 (*Dr. J. B. Davey*), belong to the variety mentioned by Loew (1860, p. 213, note 2), with the dark spot at the base of the fork of the third vein. As the male genitalia are, moreover, wholly red, as in *M. punctipennis*, I will give a name to this variety, calling it *var. inquirenda*, var. nov.; perhaps a distinct species.

22. *Molybdamoeba leucopogon*, sp. nov.

♂. Length (two specimens), 9–10 mm.

A grey species, with an oval elongate body; very distinct on account of the wholly whitish hairs of the face and the closed anal cell.

The frons bears erect black hairs and dense whitish pubescence; face whitish grey, bare below the antennae, the whitish hairs being confined to the inferior portion. Antennae very short, grey. Occiput with whitish scale-like hairs and a short fringe of white hairs. Thorax clothed with erect black hairs and short grey pubescence. The bristles are black; the hairs on the pleurae are white. Scutellum with the same clothing as the thorax and with strong black bristles on the margin. Halteres white, with yellowish stalk. Abdomen black, with yellow borders on the hind margin of the segments, clothed with grey pubescence and erect black hairs; the hairs on the sides are longer, but scales are wanting, the second and fourth segments only bearing a tuft of black hairs; marginal bristles of the last segments long and strong. Underside grey, yellowish at the tip, with white hairs; genitalia shining red, black at the base, the plate with a short black fringe. Legs black, with white scales and black bristles; tibiae reddish. Wings wholly hyaline, narrowly luteous at the extreme base. A small brown spot after the origin of the third vein; the small cross-vein and the base of the second vein placed just opposite to it are margined with fuscous, forming one dark spot; the cross-vein at the end of the second basal cell is also slightly infuscated. The recurrent stumps are very long; the second vein is sinuous at the tip; the first posterior cell is narrowed at the end; the small cross-vein is placed before the middle of the discal cell; the lower vein of the discal cell is very sinuous; anal cell closed at the margin. The veins are black, the first, however, being luteous.

Type ♂ and another specimen from North Nyasa, Akamanga, South Rukuru River, October 10, 1909 (*Dr. J. B. Davey*).

23. *Molybdamoeba decipiens*, sp. nov.

♂ ♀. Length (of 10 specimens), 7–12 mm.

This species differs from all the preceding ones by its prevalent black colour. It is very closely allied to the Mediterranean *M. tripunctata*, Wied., but differs in the colour of the legs, which are in great part yellow; indeed, the front and middle femora near the end, the tibiae, and some basal joints of the front and middle tarsi, are yellow. The white scales on the abdomen are more developed. The male genitalia are red with black base, and not prominent. The underside of the abdomen bears long white hairs, which are wanting in *M. tripunctata*. Pattern of the wings and direction of the veins the same as in *M. tripunctata*.

The female is very similar to the male; the tuft of hairs on the genitalia is light yellow.

Type ♂ from North Nyasa, Deep Bay to Vua, May 14, 1909 (*Dr. J. B. Davey*); additional specimens, all males, from Deep Bay, November 3, 1909; near Virauli Mt., July 23, 1909; from Karonga to Fort Hill, near Lufira River, May 30, 1909; from Akamanga, South Rukuru River, October 10, 1909 (all by *Dr. J. B. Davey*).

Type ♀ and a male from Nyasaland, Fort Johnston, 2000 ft., June 1910 (*Dr. A. H. Barclay*).

10. *Anthrax*, Scopoli (1763).

This is not the *Anthrax* of authors, but as I showed in my paper of 1908 (*Zeitschr. f. Hymenopterol. u. Dipteralog.*, p. 34) is the same as *Argyramoeba*, Schiner, as restricted by Dr. Sack in his monograph of 1909.

The genus seems to be very well represented in the Ethiopian fauna, as the collection contains many species; those before me can be distinguished as follows:—

1 (8). Upper branch of the fork of the third vein bent at a right angle in the middle, and with an appendix at the angle.

2 (3). Apical half of the wings with many confluent black spots; basal appendix very long; discal cell darkened in the greater part; squamulae dark. . . *pithecius*, Fabr.

3 (2). Apical portion of the wings wholly hyaline, or with 2–3 separated black spots only; discal cell in the greater part clear; basal appendix short; squamulae white.

4 (5). The basal dark marking of the wings extends broadly beyond the small cross-vein, and is in contact with the spots at the base of the cubital fork and at the end of the discal cell; no hyaline spot before the small cross-vein; plumula with a black fringe . . *diffusus*, Wied.

5 (4). Dark marking ending a little beyond the small cross-vein, and not coalescing with the cubital spot; end of the discal cell not spotted; hyaline spot at the end of the first basal cell just before the small cross-vein; plumula with a white fringe.

6 (7). Species of greater size, with larger rounded brown spots at the bases of cubital fork and third posterior cell; anal cell closed at the wing margin . *aygulus*, Fabr.

7 (6). Species of smaller size; a small cloud only at the base of cubital fork, that at the base of third cell not separated; anal cell open . . . . *homogeneus*, sp. n.

8 (1). Upper branch of the cubital fork gently curved or bent at an obtuse angle, without appendix.

9 (10). Base of the second vein without recurrent veinlet . *spec. indet.*
10 (9). Second vein with the usual recurrent veinlet at the base.
11 (12). Upper branch of the cubital fork with the portion after the bend very sinuous ; no hyaline spot before the small cross-vein . . . . . *camptocladius*, sp. n.
12 (11). The upper branch after the bend is straight ; a hyaline spot in the first basal cell just before the small cross-vein . . . . . *pasillus*, Wied.

24. *Anthrax pithecius*, Fabricius (1805).

This is a common and widespread African species, with which *conspuratus*, Wied. (1828), *confusemaculatus*, Macq. (1855), and *spectabilis*, Loew (1860), are without any doubt synonymous. The single discrepancy in Wiedemann's description of *conspuratus* is the yellowish legs : but this is a very variable character, which is affected by the relative maturity and state of preservation of the specimens. Plumula with black and white fringe. This species can perhaps be better placed in the genus *Molybdamoeba*, with the somewhat similar American *tigrina*, de G. (*simson*, Fabr.).

Several specimens from North Nyasa, Akamanga, October 8, 1909 ; Karonga, September 14, 1909 ; Remero stream, November 24, 1909, and Bundi village, Fuliwa, May 13, 1909 (all from *Dr. J. B. Davey*). Also a specimen from Southern Nigeria, Oni, seventy miles east of Lagos, May 14, 1910 (*W. A. Lamborn*).

The size varies from 8 to 14 mm.

25. *Anthrax diffusus*, Wiedemann (1824).

A. maculipennis, Macq. (1840), is without doubt the same species. *A. hessii*, Wied. (1818), has the dark marking at the base of the wings less widened. Plumula with a black fringe ; anal cell open ; there is often a rounded brown isolated spot on the lower vein of the discal cell.

A single specimen from West Nyasa, Limpachi River, November 1909 (*Dr. H. S. Stannus*). But I have the species in my collection, through the kindness of Dr. Brauns, from Willowmore, Cape Colony.

26. *Anthrax aygulus*, Fabricius (1805).

An interesting species of large size, which had not hitherto been recognised as an *Argyramoeba* in the published catalogues.

The clear portion of the wings is truly hyaline, while in the preceding species it is smoky ; the two black spots are

very conspicuous. The plumula has a white fringe, as in the following species.

A single specimen from North Nyasa, Kaporo, October 22, 1909 (*Dr. J. B. Davey*).

27. *Anthrax homogeneus*, sp. nov. (Plate L, fig. 3.)

♀. Length 7 mm.

A black species with a wing pattern very like that of *Hemipenthes morio*, with the addition of a small dark cloud at the base of the cubital fork. Head black and clothed with black hairs, only on the anterior portion of the frons are some white scaly hairs. Thorax with black hairs and sparse whitish pubescence, towards the sides the hairs are whitish grey ; pleurae grey, with short dark hairs. Halteres white, with a dark stalk. Squamulae of a quite white colour and fringed with white hairs. Scutellum shining black, with four pairs of black bristles, those of the middle crossed. Abdomen black and with black hairs, the first segment with white hairs on the sides ; hind margins of the segments with a thin border of silvery scales, the apical segments being almost wholly silvery. Legs black, the anterior tibiae dark yellowish. Wings black and hyaline ; the black begins at the end of the first vein, and runs obliquely to the apex of the anal cell, which is hyaline, going over the small cross-vein and the base of the third posterior cell. The cloud at the base of the cubital fork is very small. The prediscoidal spot is dark, not hyaline. There are two recurrent stumps ; the upper branch of the cubital fork is gently curved at the base ; anal cell open.

Type ♀, from North Nyasa, Remero stream, November 24, 1909 (*Dr. J. B. Davey*) ; a single specimen.

28. *Anthrax* spec. indet.

A single damaged specimen of this interesting species, from West Nyasa, Momberas District, November 1909 (*Dr. H. S. Stannus*).

In size and appearance very like *A. diffusus*, and with a similar wing-pattern, but the lower veins of the discal cell are all infuscated. The stumps of the recurrent veinlets are wholly wanting ; the upper branch of the cubital fork is simply S-shaped ; the anal cell is closed.

29. *Anthrax camptocladius*, sp. nov. (Plate L, fig. 4.)

♂. Length (of 5 specimens), 7–9 mm.

Closely allied to *A. homogeneus*, but easily distinguished by the very different shape of the upper branch of the cubital fork.

Head with black hairs, and very sparse pale pubescence on the fore portion of the frons. Thorax and abdomen as *A. homogeneus*.

The dark portion of the wings is not so sharply limited, and is variegated with clearer streaks; the dark spot at the base of the third posterior cell is isolated; upper branch of the cubital fork very strongly bent; anal cell broadly open, and with the apical half hyaline (not the apex alone as in *A. homogeneus*). Prediscoidal spot clear.

Type ♂ and another specimen from North Nyasa, Akamanga, South Rukuru River, October 8, 1909 (*Dr. J. B. Davey*). Three other specimens taken in the same locality by the same collector, October 10, 1909, are less typical.

30. *Anthrax pusillus*, Wiedemann (1821).

This species also has not previously been recognised as an *Argyramoeba* in the catalogues. It is near *A. leucogaster* and *volitans*, but this last shows white hairs on the side of the abdomen. The two brown clouds of the wings are often indistinct. After the small cross-vein, the border of the dark portion of the wings shows a deep hyaline indentation.

Three specimens from North Nyasa, Nyungwi stream, November 26, 1909, and Karonga to Fort Hill, near Lufira River, May 30, 1909 (*Dr. J. B. Davey*).

11. *Villa*, Lioy (1864).

The old genus *Anthrax* of authors, which, however, cannot retain this name, must be divided into several smaller genera.

The species of the Old World can be divided into the three following groups:—

1 (4). Face rounded; third joint of the antennae short.

2 (3). Very like *Anthrax* (*Argyramoeba*) in appearance, colouring and wing-pattern; pulvilli often present; larvae living on parasitic Diptera or Hymenoptera . *Hemipenthes*, Loew.

3 (2). Species not closely resembling *Anthrax*; pulvilli always wanting; wings without dark pattern, mostly wholly hyaline; larvae parasitic on Lepidoptera . *Villa*, Lioy

4 (1). Face conically prominent; third joint of the antennae elongate; pulvilli wanting; wing-pattern normally present; larvae preying on the egg-cases of locusts *Thyridanthrax*, Ost.-Sack.

Of the first group there are no species in the collection before me.

The second group, *Villa*, is the one which was called

Hyalanthrax by Osten-Sacken in 1887, and *Aspiloptera* by Künckel d'Herculais in 1905.

The collection has the three following species:—

1 (2). Face with black and yellow hairs intermingled; abdomen with scaly hairs on the sides, and a black tuft towards the middle; end of the abdomen with white tufts; tibiae black . . . . . *paniscoides*, sp. n.

2 (1). Face without black hairs; abdomen without black tuft on the middle of the sides and without white tufts at the end; tibiae yellowish.

3 (4). Abdomen with black tufts on the sides before the end *flavescens*, Loew.

4 (3). Abdomen without black tufts before the end . *albescens*, Loew.

31. *Villa paniscoides*, sp. nov.

♂ ♀. Length (of 3 specimens), 11–13 mm.

Near *paniscus*, Rossi, but very distinct on account of the black hairs on the face, and the lateral tufts of black scaly hairs on the third abdominal segment. *A. dizona*, Loew (1860), seems to be an allied species.

Frons black, that of the male very narrowed, clothed with black hairs, yellow hairs being present only upon the antennae, more abundant in the female; face with yellow hairs, but with many black hairs intermingled, chiefly towards the middle. Antennae black, very short, the terminal style longer than the whole antenna; the two basal joints bear black hairs, which in the male form a very dense fringe. Thorax clothed with yellow-grey hairs, which in front are very long and dense, and in the middle and hind portion are shorter and darker; pleurae with dense whitish hairs and a very thick tuft of white hypopleural hairs. Squamulae fuscous, with silvery white fringe. Halteres yellowish-white. Abdomen black, clothed with long grey hairs, which towards the middle are very dark; in the male there are indistinct transverse bands; the sides of the first segment with dense white hairs; on each side of the third segment is a large tuft of black scaly hairs; fourth with whitish tuft, fifth and sixth with scaly black hairs; at the end a white tuft on each side, as in *paniscus*. Underside black, with greyish hairs. Legs wholly black, with black bristles and scattered yellowish scales. Wings hyaline, narrowly yellowish at the base, with black veins; basal comb well developed, in the male black with silvery scales at the base, in the female yellowish with yellow scales; second vein not strongly bent at the end; discal cell very long; rather narrow, the small cross-vein placed before its middle.

Type ♂ from North Nyasa, Mpanda Mountain, November 20, 1909 (*Dr. J. B. Davey*). Type ♀ and another specimen from West Nyasa, Limpachi River, October 1909 (*Dr. H. S. Stannus*).

32. *Villa flavescens*, Loew (1860).

A single couple, agreeing well with the description. Face without black hairs. The male (hitherto unknown) shows a silvery scale at the base of the wing.

The ♂ from North Nyasa, from Deep Bay to Vua, May 14, 1909 (*Dr. J. B. Davey*); the ♀ from West Nyasa (*Dr. H. S. Stannus*).

33. *Villa albescens*, Loew (1860).

Closely allied to the preceding, but quite distinct; face also without black hairs.

A couple from Southern Nigeria, Oshogbo, February 1-27. 1910 (*J. J. Simpson*).

These two species are not unlike our European species of the group *ixion-humilis*, but have the tibiae yellowish and covered with yellow scales; *V. lasia* and *sexfasciata*, Wied., belongs also to the same group.

12. *Thyridanthrax*, Osten-Sacken (1886).

This name was originally proposed for the species related to *fenestratus* and *elegans*, which show the characteristic wing-pattern with the dark marking interrupted by pellucid spots on the cross-veins and bifurcations. But I find that it is impossible to separate from this group the species of the group *afer*, notwithstanding the different pattern of the wings; the third joint of the antennae also shows gradations from the short to the elongate form.

Some species of this group have hyaline wings without, or almost without, any pattern; these species cannot be confused with those of *Villa*, on account of the form of the face, which is projecting, not rounded.

The species of this genus are of economic importance, as they prey upon the egg-cases of locusts.

The species before me can be distinguished as follows:—

1 (2). Third joint of the antennae in the shape of an elongate cone, gradually tapering to a style which is shorter than the cone; dark marking of the wings with pellucid spots; head, scutellum and abdomen in great part red . . . . . *macquarti*, sp. n.

2 (1). Third joint less elongate and with longer style; dark marking without pellucid spots; head, scutellum and abdomen black.

3 (6). Wings with black veins and darkened or black costal cell; colour of the body black; notopleural hairs mostly black.

4 (5). Wings hyaline, with the extreme base black and the costal cell darkened; pleurae with black hairs. *melanopleurus*, sp. n.

5 (4). Wings with the basal third dark brown, the basal cells being also included in the dark portion . . *abruptus*, Loew.

6 (3). Costal cell hyaline; wing veins partly yellow; colour more greyish; notopleural hairs pale . . . spp. ind.

34. *Thyridanthrax macquarti*, sp. nov. (Plate L, fig. 5.)

♂ ♀. Length (of 7 specimens), 7 to 9 mm.

An elegant species with conspicuously bright red abdomen and pellucid spots in the dark area of the wings. It agrees tolerably with the description of *A. fenestralis*, Macquart (1840), from the Cape, and is perhaps the same; but in the specimens before me the two basal joints of the antennae are red, a thing of which Macquart says nothing; in any case his name must be changed, because there is already another *A. fenestralis*, Wied. (1830), from Brazil.

Face wholly yellow, with white hairs; frons also yellow, but black near the vertex and clothed with black erect hairs. Thorax black; the hairs of the dorsum are denuded, but the sides show whitish hairs. Scutellum red, black at the base. Metapleural hairs and halteres white. Abdomen wholly red, with a basal triangular black spot, which usually reaches only the hind margin of the third segment, but sometimes extends as a black median stripe to the last segment; the hairs are denuded. Legs black, with the tips of the femora and tibiae red. Wings hyaline, yellowish towards the base; in the middle there is a brown cross-band, in which are to be seen 3–4 subpellucid spots at the cross-veins; this band does not reach the hind margin of the wings; the tip of the discal cell is hyaline.

Types ♂ ♀ and five other specimens from North Nyasa, Fort Hill, September 26, 1909 (*Dr. J. B. Davey*).

35. *Thyridanthrax melanopleurus*, sp. nov. (Plate L, fig. 6.)

♀. Length (of 5 specimens), 5–10 mm.

A black species near *linea*, Loew, but distinguished by the black-haired pleurae.

Head wholly black; face and frons clothed with black hairs, the last almost without pale pubescence; antennae black, the third

joint with a short point and a rather long style. Thorax with black hairs, in front also; the side shows an entire white longitudinal stripe, which is continuous with the white spots on the indentation of the hind margin of the eyes; pleurae wholly black-haired, sometimes a few pale hairs in the posterior part of the metapleural tuft. Scutellum black. Halteres brownish. Abdomen black; on the sides at the base are white hairs; the third segment bears at base an entire but narrow transverse band of white hairs; the sides of the abdomen bear dense tufts of black scaly hairs. Legs wholly black, with black bristles and black pubescence. Wings hyaline, with black veins; the base is black as far as the basal cross-veins; costal cell darkened; the small cross-vein is broad and with a narrow dark margin. Squamulae with a white fringe.

Type ♀ and four additional specimens from North Nyasa, Nyika Plateau, Rongorwi stream, August 29, 1909 (*Dr. J. B. Davey*).

36. *Thyridanthrax abruptus*, Loew (1860).

Allied to the preceding, but showing a more extended dark pattern on the wings. The hairs on the front of the thorax are yellow. Squamulae with a yellowish fringe. Metapleural hairs partly black. Wing veins black.

A specimen from North Nyasa, Kabwiia stream, August 31, 1909 (*Dr. J. B. Davey*); another from West Nyasa, Momberas District, October 1909 (*Dr. H. S. Stannus*); and one from Northern Nigeria, Minna, October 10, 1910 (*J. J. Simpson*).

37. *Thyridanthrax* sp. indet.

A single badly-preserved specimen of a grey species, the wings of which are hyaline, with the extreme base only black. I think that is only a form of the Mediterranean *T. vagans*, Loew.

North Nyasa, Vua, October 28, 1909 (*Dr. J. B. Davey*).

38. *Thyridanthrax* sp. indet.

A single specimen of another smaller species, allied to the preceding one and to *T. leucoproctus*, Loew (1860), from the Cape.

North Nyasa, Bundi Village, Fuliwa, May 13, 1909 (*Dr. J. B. Davey*).

13. *Isotamia*, gen. nov.

Type: *Isotamia daveyi*, sp. nov.

This genus can be regarded as an *Exoprosopa* with very long proboscis and very narrowed wings, which are almost

petiolate at the base; the origin of the second vein takes place much before the small cross-vein, and the anal cell is of equal size throughout its length (whence the name, *isos* and *tamcion*).

Face but little projecting; antennae short, widely separated from each other; the third joint short, the styliform portion terminating in a short style, $1\frac{1}{2}$ times the length of the whole antenna. Proboscis $2\frac{1}{2}$ times as long as the head. Eyes with a deep indentation. Mouth opening very broad. Legs of the *Exoprosopa* type; claws very small; hind claws with a basal tooth.

Wings very long and narrow, at the base elongately cuneate, anal lobe and alula absent; prealar hook small; no basal comb. First vein distant from the costa, the costal and subcostal cells therefore broad; second vein strongly bent at the tip; marginal cell broad; three very large submarginal cells; four posterior cells all open; anal cell in its middle as broad as at the end, or only a little broader at end; discal cell on the middle of the wing, short, not broader than the second basal cell; small cross-vein placed a little after the middle of the discal cell; the vein dividing the third from the fourth posterior cell placed towards the middle of the discal cell, which there makes a protuding angle; the third longitudinal vein begins in a right angle before the small cross-vein, at a distance from this which is two or more times the length of the veinlet. The width of the cells on the anterior portion of the wings and the narrowness of those on the hind portion are so striking that the third longitudinal vein becomes therefore placed a little behind the median axis of the wing.

39. *Isotamia daveyi*, sp. nov. (Plate L, fig. 7.)

♀. Length of the body 7 mm., of the proboscis 4 mm., of the wings 7 mm.

A black and black-haired species, with pale pubescence on the thorax and abdomen, and with the anterior half of the wing blackened.

Frons with sparse, pale tomentum; hind margin of the eyes with a narrow white border; antennae and proboscis black. Thorax and scutellum with yellow pubescence; hind margin of the scutellum with whitish tomentum; the hairs black, but in the middle of the front part there are a few yellow hairs; pleurae covered with strong and rough black bristly hairs; metapleural hairs also black. Squamulae less distinct; halteres black. Abdomen black, with yellow and white pubescence; the second segment bears a broad band of white tomentum; the hairs on the sides of the first segment are

strong and rough, like those on the pleura. Legs black and with black bristles; the tibiae are yellow, the two anterior pairs paler. Wings greyish hyaline, with black veins. The narrowed petiolated base is black to the basal cross-veins; the limit of the black begins at the fore border a little after the end of the second vein, and runs obliquely to the third vein, to the small cross-vein, to the base of the discal cell, and to the middle of the anal cell; there are three projecting black teeth, one at the base of the first submarginal cell, one on the middle cross-vein and one at the apex of the second basal cell. The very broad second basal cell bears at its end a pellucid spot.

Type ♀ from North Nyasa, Kaulunga Village, near Lufira River, July 18, 1909, collected by *Dr. J. B. Davey*, in whose honour the species is named; a single specimen.

14. *Litorrhynchus*, Macquart (1840).

I here regard this genus as distinct from *Exoprosopa*. The species have a restricted geographical distribution, being exclusively found in Central and South Africa; they may be distinguished by the characters of the proboscis and by the wing-pattern. Mr. Verrall also, in his masterly and splendid work on British Flies, V, p. 479, mentions this genus as a distinct one.

I will give here the essential characters of the genus:—

Face rounded, not conically projecting; mouth opening more elevated; proboscis at least twice as long as the head; frons of the male broad; style of the antennae longer than the third joint. The abdomen bears spots of silvery scales on the third segment; the antennae and legs are partly red. Hind claws with a tooth. The origin of the second longitudinal vein takes place always opposite to the small cross-vein; the basal vein of the second posterior cell is of equal length to that on the base of the third, and is placed in the same line with the axis of the wing. Pattern of the wings very uniform, consisting of two broad cross-bands of yellowish-brown or blackish colour.

The species of this genus are fairly numerous and can be divided into two very distinct groups:—

A. *First group.* Pattern of the wings brown or yellowish-brown, not black; the vein dividing the second from the third posterior cell is extraordinarily bent against the fore margin of the wing, and therefore the third posterior cell is two or three times as broad as the second. Palpi of a

yellowish colour. Colouring of the body in great part reddish.

The species of this group before me can be distinguished as follows:—

1 (2). The brown pattern of the marginal cell ends a little after the veinlet dividing the first from the second submarginal cell and leaves therefore a fairly broad apical hyaline space . . . . . *basalis*, Ric.

2 (1). The marginal cell is filled up by the brown pattern to the end, or almost to the end.

3 (6). The marginal cell is filled up by the brown pattern to its end and even a little beyond ; thorax black.

4 (5). The bristles of the hypopleural tuft are all of a golden colour, or only a few are black; squamulae with the fringe golden *nyasae*, Ric.

5 (4). Hypopleural tuft with black bristles ; squamulae fringed with argenteous . . . . *argyrolepis*, sp. n.

6 (3). The brown tint of the marginal cell leaves at the end a small hyaline space. Thorax red, with black stripes.

7 (8). The first posterior cell is broadly hyaline at the end ; thorax with three black stripes . . . *ricardoi*, sp. n.

8 (7). The first posterior cell is filled with brown almost to the end; thorax with two black stripes . *dentiferus*, sp. n.

40. *Litorrhynchus basalis*, Ricardo (1901). (Plate L, fig. 8.)

Four gigantic specimens, 20 mm. in length, and with a wing-expanse of 46 mm., all from North Nyasa, Karonga to Fort Hill, near Lufira River, May 30, 1909 (*Dr. J. B. Davey*).

These specimens agree very well with the description; but I think that this species is perhaps the same as *macropterus*, Loew (1860); the difference in the shape of the pattern at the base of the wings is very small. Loew records also a specimen of his species of eight lines in length.

41. *Litorrhynchus nyasae*, Ricardo (1901). (Plate L, fig. 9.)

A specimen from North Nyasa, in bush near Vua, May 15, 1909 (*Dr. J. B. Davey*); compared with co-type by Mr. E. E. Austen. Another smaller specimen from West Nyasa (*Dr. H. S. Stannus*).

42. *Litorrhynchus argyrolepis*, sp. nov.

♂ ♀. Length (of 3 specimens), 12–13 mm. Closely allied to the preceding species, but easily distinguished from this and from all the others by the squamulae being fringed with silvery hairs. Head reddish-brown ; frons and face with yellow pubescence and black hairs ; antennae red, with the third joint and the style black ; proboscis black, 5–6 mm. long. Thorax wholly black, with yellowish pubescence and black bristles ; pleurae with black and reddish hairs intermingled ; hypopleural tuft black, scutellum red, narrowly black at base, clothed like the thorax, with 8–10 marginal bristles. Halteres blackish. Abdomen black, more or less red on the sides and at the hind margin of the segments ; first segment with white hairs on the sides ; the other segments with dense black hairs on the sides ; sixth and seventh with white scales ; the usual white spots on the third are very well developed. Legs red, with black bristles ; tarsi darkened. Pattern of the wings as in *L. nyasae* ; the middle cross-band is often narrowed towards the hind margin of the wings, not filling up the whole width of the end of the third posterior cell.

Types ♂ and ♀ and another specimen from West Nyasa, Nora, Choma and Mzimba, May–August, 1909 (*Dr. H. S. Stannus*).

43. *Litorrhynchus ricardoi*, sp. nov. (Plate L, fig 10.)

♀. Length of the body (of 2 specimens) 14–15 mm., of the wing 17–18 mm., of the wing-expanse 38–41 mm.

Very near the preceding, but larger, with clearer wing-pattern, and with the marginal cell narrowly hyaline at the end.

The hairs on the frons are black, those on the face wholly whitish ; antennae red, the third joint blackish ; hind margin of the eyes whitish. Thorax red, with three longitudinal black stripes, which unite at a single spot in front of the scutellum ; the hairs of the collar and of the pleurae are all of a golden colour ; the bristles are black. Scutellum red, with a marginal row of black bristles. Squamulae with a thick golden fringe ; halteres blackish. Abdomen red, with a narrow median black stripe, which does not extend beyond the fourth segment ; the hairs on the sides of the first segment are white, the others black ; the usual white spots are well developed ; underside, red. Legs wholly red. Markings of the wings yellowish-brown, darkened towards the margins of the bands ; their general shape as in *L. nyasae*, with the above-noted differences ; the hyaline spot in the second basal cell is very greatly developed.

Named in honour of Miss G. Ricardo, who has done good work in studying the South African Bombyliids.

Type ♀ and an additional specimen from West Nyasa, Mzimba and Mbwabwa, in Momberas District, May–June 1909 (*Dr. H. S. Stannus*).

44. *Litorrhynchus dentiferus*, sp. nov. (Plate L, fig. 11.)

♂. Length of the body 17 mm., of the wing 20 mm., of the wing-expanse, 45 mm.

A beautiful species very near the preceding, but readily distinguished by the different colouring of the thorax and wings.

Antennae wholly red. Thorax with the two longitudinal stripes very narrow and wide apart, and without a black spot in front of the scutellum; a whitish stripe on the sides of the back; the thoracic bristles are yellow, but those on the margins of the scutellum are black. Abdomen red; the first three segments with a median triangular black spot only; genitalia red, with a yellow fringe. Legs wholly red. Pattern of the wings as in *L. ricardoi*, but of a more yellow tint; the tooth-shaped projection on the first posterior cell is very characteristic; the base of wing is yellow; the spot in the second basal cell is smaller and less hyaline.

Type ♂, from West Nyasa (*Dr. H. S. Stannus*); a single specimen.

B. *Second group.* Colour of the body and of the wing-pattern black. Palpi darkened. Genitalia of the male black. The vein dividing the second from the third posterior cell much less curved forward, and therefore the third posterior cell only $1\frac{1}{2}$ times broader than the second.

While the species of the first group seem to be principally confined to South and East Central Africa, those of this second group are more prevalent to the North of the Equator. The species before me are to be distinguished as follows:—

1 (2). The marginal cell is filled with black in its whole length, the black pattern extending even a little beyond its end
repletus, sp. n.

2 (1). The marginal cell is broadly hyaline at apex.

3 (6). Propleural and metapleural hairs black; small cross-vein without pellucid spot.

4 (5). Middle band of the wing narrowed towards its lower end, filling only a part of the third posterior cell
rostratus, Loew.

5 (4). Middle band dilated towards its lower end, filling almost the whole of the second and third posterior cells
dilatatus, sp. n.

6 (3). Propleurae and metapleurae with golden-reddish hairs; a pellucid spot on the small cross-vein.

7 (8). Third joint of the antennae elongated, as long as or longer than the style . . . . . *tollini*, Loew.

8 (7). Third joint short, much shorter than the style *perplexus*, sp. n.

45. *Litorrhynchus repletus*, sp. nov. (Plate L, fig. 12.)

♀. Length of the body 6 mm., of the wing 8 mm. A small species, very distinct from all the others of this second group, owing to the black end of the marginal cell.

Head, dark yellowish, blackened on the frons and on the occiput, clothed with black hairs and with sparse pale pubescence, antennae short, the two basal joints reddish, the third blackened, of a short conical shape, much shorter than the style. Proboscis 4 mm. long; palpi darkened. Thorax black, with pale pubescence; the hairs are long, those on the collar yellow, on the pleurae partly black and partly golden; the bristles are black and very long. Halteres black, with greyish knob. Scutellum dark red, with very long marginal black bristles. Squamulae blackish. Abdomen black, red on the sides of second, third and fourth segments; first segment with white hairs on the sides; the silvery spots on the third segment are well developed; the hairs are black, those on the sides are disposed in the shape of a fringe, and are all black. Spines of the female genitalia yellow; underside of the abdomen dark blackish, yellowish towards the middle. Legs dark reddish, the tibiae paler; bristles black; tooth of the hind claws very small, indistinct. Pattern of the wing black, as in the following species; but the black colour fills the marginal cell and extends over half of the apical submarginal cell; small cross-vein without pellucid spot; hyaline spot of the second basal cell large; the upper internal angle of the first submarginal cell is also blackened, while in the other species it is always hyaline. Middle cross-band broad at the end, filling the half of the second, and the whole of the third posterior cells; basal cross-band distant from the apex of the discal cell.

The left wing of the single specimen examined shows only two submarginal cells, the dividing veinlet being reduced to a stump.

Type ♀ from West Nyasa, Choma, 4000 ft., May 1909 (*Dr. H. S. Stannus*).

46. *Litorrhynchus rostratus*, Loew (1860).

Distinguished by the conspicuous tufts of black hairs on the sides of the thorax. The black basal band extends to the apex of the anal cell, or ends only a little before it.

The stumps of veins described by Loew are often wanting. Two specimens from West Nyasa, Mulowe (*Dr. H. S. Stannus*).

47. *Litorrhynchus dilatatus*, sp. nov.

♀. Length of the body (of 2 specimens) 10–11 mm., of the wings 11–12 mm.

Very closely allied to the preceding species, but distinguished by the middle cross-band of the wing being dilated at the lower end.

Head as in *L. rostratus*; the antennae also, but the third joint reddish. Thorax in front with a collar of reddish hairs; pleurae with the black tuft of the preceding, and a white tuft beneath the posterior calli. Halteres and squamulae blackish, scutellum reddish, with black marginal bristles. Abdomen black, narrowly reddish on the sides of the second and third segments; its hairs are black, those on the sides also, with the exception of the first segment, which is clothed with the usual white hairs. The silvery spots on the third, fifth and sixth segments are normally developed. Underside black, reddish at the base; terminal spines of the female genitalia red. Legs reddish, including the coxae; femora and taris more darkened; bristles black. Wings as in *L. rostratus*, but the basal band reaching always the end of the anal cell; small cross-vein without pellucid spot.

Type ♀ from North Nyasa, Karonga, May 26, 1909 (*Dr. J. B. Davey*); an additional specimen from West Nyasa, Mulowe (*Dr. H. S. Stannus*).

48. *Litorrhynchus tollini*, Loew (1863). (Plate L, fig. 13.)

Distinguished by the very elongate third antennal joint, and the reddish tufts on the sides of thorax. The pattern of the wings is very like that of *L. rostratus*, but the small cross-vein is usually enclosed in a pellucid spot, and the basal band is very distant from the end of the anal cell.

I am very doubtful if this species can be separated from *L. senegalensis*, Macquart (1840); and my *L. erythraeus* (1906) seems to be also the same widely spread species.

Two specimens from North Nyasa, Karonga to Fort Hill, near Lufira River, May 30, 1909, and Mt. Waller, September 1, 1909 (*Dr. J. B. Davey*); another specimen from West Nyasa, Choma, May 1909 (*Dr. H. S. Stannus*).

49. *Litorrhynchus perplexus*, sp. nov.

♀. Length of the body 11 mm.; of wing 13 mm. Distinguished from the preceding by its smaller size and short third antennal joint.

Head reddish-brown, darkened above and behind. Antennae wholly yellow, with a very long style; thorax with the collar yellow-haired; lateral tufts with yellow and black hairs intermingled; the white tufts below the posterior calli are large; the bristles are black. Scutellum reddish. Abdomen reddish on the sides of the second, third and fourth segments; the hairs and spots as usual. Legs wholly yellowish-red, wings as in *L. rostratus*, but the pellucid spot on the small cross-vein less developed; basal band distant from the end of the anal cell. The outward margins of the two cross-bands are more straight than in the related species; the middle band not filling the apex of the second posterior cell, which remains hyaline in its whole length along the hind margin of the wing.

Type ♀, from West Nyasa, Ekwendeni (*Dr. H. S. Stannus*); a single specimen.

15. *Exoprosopa*, Macquart (1840).

Even as restricted here, with the exclusion of the genera *Litorrhynchus* and *Hyperalonia*, this genus remains a very rich one; and it must be recognised that the species included in it are rather heterogeneous.

It is very probable that many species, if not all, have, during their larval life, habits similar to those of *Thyridanthrax*.

The numerous forms in the collection can be divided as follows:—

1 (4). Discal cell with a strong right angle projecting into the third posterior cell.

2 (3). Body and legs black; wings almost all blackish *umbrosa*, Loew, p. 638.

3 (2). Head, abdomen and legs yellow; wings yellowish hyaline *inermis*, sp. n., p. 638.

4 (1). Discal cell without such an angle projecting into the third posterior cell, the vein dividing it from this cell being straight or only S-shaped.

5 (10). The transverse vein between the discal cell and the second basal cell very strongly S-shaped.

6 (7). Wing darkened almost over its entire surface, with broad fuscous borders along the veins; discal cell very pointed externally, as in *Litorrhynchus*; second longitudinal vein very strongly bent at its end; abdomen clothed with long erect black hairs . . . *venosa*, Wied., p. 639.

7 (6). Wings not so coloured; discal cell more obtuse; second longitudinal vein not so curved before the end; abdomen without black erect hairs.

8 (9). Wings darkened, the costal portion more intensively; first posterior cell very narrowed at the end; abdomen with patches of scales on the sides . *lepidogastra*, sp. n., p. 639.

9 (8). Wings clear, obliquely bordered with black on the anterior half; first posterior cell broadly open; sides of the abdomen without scales . . *sigmoidea*, sp. n., p. 640.

10 (5). The transverse vein between the discal and the second basal cell straight, or only slightly curved.

11 (22). Wings obliquely bordered with black on the anterior half and the posterior half clear, without isolated black spots and with the discal cell mostly hyaline.

12 (19). The black fore border of the wings without any black projection on the external upper angle of the discal cell; legs black or with only reddish tibiae.

13 (16). Pleurae wholly with yellowish hairs or with the yellow hairs predominant; metapleural tuft yellow-grey, absolutely without black hairs.

14 (15). Antennae black; sides of the second, third and fourth abdominal segments with a single broad silvery spot, which is connected with a white transverse band on the third segment; discal cell short and broad. *dimidiata*, Macq. p. 641.

15 (14). Antennae reddish at base; sides of the abdomen without such a large silvery spot; discal cell narrow and more than twice as long as broad . *discriminata*, sp. n., p. 641.

16 (13). Pleurae with black hairs; metapleural tuft black or with the black hairs predominant.

17 (18). Third abdominal segment only with a white band; metapleural tuft black; tibiae black; black costal border of the wings extending beyond the small cross-vein; species of greater size . . . . *luctifera*, sp. n., p. 642.

18 (17). Abdomen with the second, third and fourth segments wholly argenteous; metapleural tuft black and grey; tibiae reddish; black costal border ending a little beyond the small cross-vein; species of smaller size *argyrophora*, sp. n., p. 643.

19 (12). The black fore border with a black tooth over the external angle of the discal cell; legs reddish or red.

20 (21). The external upper angle of the discal cell is wholly filled with black . . . *argentifrons*, Macq., p. 643.

21 (20). The external upper angle of the discal cell is hyaline *scaligera*, sp. n., p. 643.

22 (11). Wings not so coloured.

23 (26). Wings mostly black, with hyaline apex; discal cell almost all black; no isolated brown spots; some pellucid spots on the cross-veins.

24 (25). Wings black also at the base and along the whole fore border; yellowish spots on the cross-veins very small; third posterior cell shorter than the fourth; head, abdomen, antennae and legs black . *jacchoides*, sp. n., p. 644.

25 (24). Wings yellow at base and in the middle of the fore border; yellow spots on the cross-veins very broad, therefore the wing-pattern showing two black bands fused together on the hind margin; third posterior cell as long as the fourth; head, abdomen, antennae and legs red *laeta*, Loew, p. 645.

26 (23). Wings mostly or wholly hyaline; if the fore border is dark, the posterior edge of the marking is not sharply defined; the discal cell is always hyaline; there are sometimes isolated brown spots on the cross-veins.

27 (38). Wings with the fore border narrowly darkened along the costa, but not sharply defined; cross-veins for the most part infuscated.

28 (37). Abdomen of conical shape; face strongly conical and projecting; some cross-veins infuscated.

29 (30). Thorax with a distinct white stripe on the sides; abdomen with white scales; all the cross-veins margined with fuscous . . . . . *punctulata*, Macq., p. 645.

30 (29). Thorax without lateral white stripe on the dorsum; the second cross-vein not margined with fuscous.

31 (32). Legs and antennae entirely black . *major*, Ric., p. 646.

32 (31). Legs and antennae partly red.

33 (34). Basal joints of the antennae red; frons almost without black hairs; very large species, without black bands on the abdomen . . . . . *batrachoides*, sp. n., p. 646.

34 (33). Basal joints of the antennae black.

35 (36). Femora entirely red; hairs of the body grey, without black hairs on thorax; wings hyaline . *stannusi*, sp. n., p. 647.

36 (35). Femora with a black stripe; hairs of thorax of a golden colour, mesopleurae with black hairs; halteres and wings darkened . . . . . *capnoptera*, sp. n., p. 648.

37 (28). Abdomen not conical; face less projecting, almost rounded as in *Litorrhynchus*; cross-veins not infuscated *penthoptera*, sp. n., p. 648.

38 (27). Wings entirely hyaline, or only slightly yellowish along the costal cell.

39 (40). Third antennal joint very elongate, without style, and yellow in its basal half . . . . *heterocera*, sp. n., p. 649.

40 (39). Third joint of the antennae entirely black, not so long, and often very short, always with distinct style.

41 (42). Third joint of the antennae very short, ending in a short point, with the terminal style longer than the joint itself; large species of the appearance of a *Villa* *villaeformis*, sp. n., p. 650.

42 (41). Third joint longer than the style.

43 (46). Legs and body black.

44 (45). Hairs of the breast grey . . *minois*, Loew, p. 650.

45 (44). Hairs of the breast black . *hypomelaena*, sp. n., p. 651.

46 (43). Legs and body partly red.

47 (48). Wings with a slight yellowish tint; hairs on the pleurae yellowish-grey . . . . *inornata*, Loew, p. 651.

48 (47). Wings pure hyaline; hairs on the pleurae pure white spec. indet., p. 651.

50. *Exoprosopa umbrosa*, Loew (1860).

A single female from West Nyasa (*Dr. H. S. Stannus*), which agrees well enough with the description. The third posterior cell is a little shorter than the second, and at the apex is only a little broader than the same cell. The angle of the discal cell shows the stump in the third posterior cell, as stated by Loew; but there is a second stump in the discal cell itself, beginning at the vein dividing the second from the third posterior cell and making a small supernumerary cell in the upper apical corner of the discal cell. The spines of the female genitalia are yellowish-red.

51. *Exoprosopa inermis*, sp. nov.

♂. Length of the body 12 mm., of the wings 10 mm.

A species characterised by the angle of the discal cell and the luteous colour of the head, abdomen and legs; a striking character distinguishing it from any other species is the apparent absence of bristles on the thorax and scutellum, but I am not absolutely sure of this, owing to the poor preservation of the specimen; at any rate I cannot find a trace of the points of insertion of the bristles, if these are denuded.

Face not projecting at all, rounded, convex, shining; frons broad, for a male, with sparse yellowish pubescence and short black hairs; antennae yellow, the third joint a little darkened, of conical shape, longer than the two basal joints together, with the terminal style as long as one-third of the joint itself. Proboscis black, not prominent.

Thorax black, with a yellow spot before the scutellum and yellow shoulders; it is clothed with dense grey hairs, without any black hairs, as are also the pleurae; the tomentum is yellow; the usual bristles are wanting, so far as I can see; metapleural tuft white; squamulae dark brown, with a whitish fringe; halteres yellow. Scutellum yellow, with white hairs, without bristles. Abdomen of oval shape, entirely yellow, with a black rounded basal spot in the middle of the second segment and very narrow transverse black stripes before the hind margin of the second and third segments; there is white tomentum on the sides and on the venter; first segment with whitish hairs on the sides. Male genitalia yellow. Legs wholly yellow, the tarsi darkened at the tip; hind tibiae with short black bristles; ungues with the base red and bearing a small tooth; femora without bristles. Wings short and broad, greyish hyaline, with a yellowish tint, which is more intense towards the base and along the fore margin; veins thick, yellow, brown outwardly; small cross-vein placed a little before the middle of the discal cell; base of the second vein opposite to the small cross-vein; the vein dividing the second from the third submarginal cell bent at a right angle in the middle and here with a short stump; the first posterior cell very broadly open, second and third almost of equal width at the end; discal cell short and of a very characteristic shape, its posterior boundary deeply bisinuate, forming with the proximal boundary a wide W with rounded angles; in the right wing only of the typical specimen the middle angle of the W emits an appendix into the cell. Anal cell broadly open. Prealar hook yellow; basal comb of the wings yellow.

Type ♂, from North Nyasa, Lake shore, near Deep Bay, December 25, 1909 (*Dr. J. B. Davey*); a single specimen.

52. *Exoprosopa venosa,* Wiedemann (1819).

A single specimen from Nyasaland, Blantyre, April 20, 1910 (*Dr. J. E. S. Old*), which agrees well enough with Loew's description, but has a rather longer proboscis and the white scales of the abdomen disposed in a somewhat different manner. The long erect black hairs covering the upperside of the abdomen are very peculiar.

53. *Exoprosopa lepidogastra,* sp. nov.

♀. Length of the body (of 5 specimens) 12–13 mm., of the wing 11–12 mm.

A very distinct species owing to its quite narrow and elongated discal cell and the conspicuous patches of black scales on the sides of the abdomen.

Head wholly black ; face projecting, the hairs black, with a black fringe, towards the margins of the mouth ; frons narrow for a female, clothed with long black hairs and sparse yellow pubescence, which is also to be seen on the face ; occiput with short grey pubescence and white tomentum at the indentation of the eyes. Antennae black, long; first joint twice as long as the second, which is globular and sometimes of a dark reddish colour; third joint narrow, elongate, twice as long as the two basal joints together ; style short, only half as long as the third joint, bearing a distinct terminal bristle. Proboscis black, a little projecting. Thorax and scutellum black ; the hairs of the collar and of the sides are yellow; pleurae clothed with black hairs, but on the propleurae there is a golden yellow tuft ; metapleural tufts black ; the bristles are long and black. Squamulae black, with a white fringe ; halteres black, with greyish knob. Scutellum with long marginal black bristles. Abdomen entirely black ; first segment with a tuft of yellow hairs on the sides, the others showing only black hairs ; the bands of tomentum on the segments are yellowish before and whitish behind ; the patches of large black scales are on the sides of the segments from the second to the last. Venter black-haired ; spines of the female genitalia red. Legs entirely black, with black pubescence and black spines ; ungues black, with the tooth long. Wings long and narrow ; the costal third is blackish, but showing a graduated passage to the posterior darkened portion ; cross-veins with indistinct dark borders; the basal comb and the prealar hook are black. No stumps of veins; small cross-vein placed on the first third of the discal cell and a little after the origin of the second vein; discal cell very long and narrow, not broader than the second basal cell ; first posterior cell very narrowed at the end, second and third of equal width ; the transverse vein between the discal and the second posterior cell is very strongly S-shaped. Prediscoidal spot whitish.

Type ♀, from North Nyasa, Wovwi stream, near Deep Bay, May 14, 1909 (*Dr. J. E. Davey*); three additional specimens from West Nyasa, Mulowe and Nsisga (*Dr. H. S. Stannus*); another specimen from Nyasaland, Blantyre, April 25, 1910 (*Dr. J. E. S. Old*).

54. *Exoprosopa sigmoidea*, sp. nov.

♂. Length of the body 12 mm., of wing 13 mm.

A species belonging to the group of *E. dimidiata*, but very distinct owing to the strongly S-shaped cross-vein between the discal cell and second posterior cell.

Head black, with grey pubescence and black erect hairs on the frons ; face projecting; mouth edges with a pale fringe, with

short and sparse black hairs. Antennae with the first two joints of a red colour; first joint very long; third joint in the shape of an elongate cone, as long as the first two together and bearing a style shorter than itself. Proboscis black, long, but not projecting. Thorax black; with the exception of the black bristles, all the other hairs seem to be yellowish, and those on the metapleura also. Squamulae of a dark colour, with a yellowish fringe; halteres with yellow knob and dark stalk. Scutellum black, reddish at the hind margin, with black marginal bristles. Abdomen black, reddish on the sides of second and third segments and yellowish on the venter, which has only the basal portion of the segments darkened; third segment with entire transverse band of white tomentum, fourth and fifth with interrupted bands, the others seem to be all covered with white tomentum; sides with black hairs. Legs wholly black, with black pubescence and black bristles, but the hind femora have yellowish tomentum towards the base; ungues long, with a very strong tooth. Wings hyaline, one-half brown; the limit of the dark fore border runs obliquely from the end of the second longitudinal vein along the middle of the discal cell to the base of the fourth posterior cell and to the middle of the anal cell. Prediscoidal spot greyish; third longitudinal vein very curved at the end; first posterior cell not narrowed; the second vein beginning opposite to the small cross-vein; second, third and fourth posterior cells of about equal width. Discal cell longer than in *E. dimidiata* and much narrower towards the base; the vein dividing it from the second basal cell very strongly S-shaped.

Type ♂, from West Nyasa (*Dr. H. S. Stannus*); a single specimen.

55. *Exoprosopa dimidiata*, Macquart (1846).

I here follow Loew's definition of this species; but it seems that the African fauna is very rich in allied species, some of which are very difficult to distinguish.

The third antennal joint, which was wanting in Loew's specimen, is of short conical shape, equal in length to the first two joints together and as long as the style which it bears; the first joint is short and black. Loew says that the pleurae bear also some black hairs, which, however, in the second specimen are sparse; in my specimen there are no black hairs; as stated by Loew, the metapleural tuft is always yellowish.

A single specimen from Uganda, Peta, December 15, 1910 (*C. C. Gowdey*).

56. *Exoprosopa discriminata*, sp. nov. (Plate L, fig. 15.)

♂. Length of the body 12 mm., of the wing 13 mm.

Very near the preceding, but well distinguished by the characters given above in the table. This species is perhaps the same as the aberrant ♀ specimen of *E. dimidiata* described by Loew (*l. c.*, p. 276), chiefly in regard to the form of the discal cell. It seems, moreover, to be nearly allied to *E. sigmoidea* described above, of which it is perhaps only a variety. The two species have a similarly shaped discal cell; but the vein dividing it from the second basal cell is in *E. discriminata* only slightly curved; and the black fore border of the wing is more narrow, being in *sigmoidea* as broad as in *E. dimidiata*.

Head black, with yellowish scales on the lower portion of the frons and on the face; frons black-haired. Antennae with the two basal joints of a red colour; third joint black, more long and thin than in *E. dimidiata*, shaped as in *E. sigmoidea*, the style being shorter than the joint itself. Thorax with a distinct stripe of yellowish pubescence on the sides; mesopleurae with some black hairs; bristles black. Scutellum dark reddish, with yellowish pubescence and black bristles. Abdomen black; first segment with white hairs on the sides, the others black-haired; it seems that the third segment bears a dorsal band of white scales; the fourth and fifth have these scales only on the sides, the sixth and seventh are all covered with scales. Venter clothed with yellowish pubescence and pale hairs. Genitalia black, yellowish at the end. Legs entirely black, with black pubescence and with black bristles. Wings longer than in *E. dimidiata*; the black pattern is more narrow, reaching only the first third of the discal cell; this cell is almost three times as long as broad, and much narrowed before the base (in *dimidiata* only twice as long as broad, and not narrowed towards the base); its exterior vein is only slightly curved; the first posterior cell is much narrowed at the end.

Type ♂, from Nyasaland, Fort Johnston, April 2, 1910 (*Dr. A. H. Barclay*); a single specimen.

57. *Exoprosopa luctifera*, sp. nov. (Plate L, fig. 16.)

♀. Length of the body 12 mm., of the wing 12 mm.

Very near *E. dimidiata*, but characterised by the black metapleural tuft.

Third joint of the antennae of the same short conical shape as in *E. dimidiata*; basal joints black. Thorax with the hairs of the collar only yellow, those on the pleurae entirely black. Scutellum with reddish hind margin. Squamulae with a dark fringe. Abdomen black; the white clothing seems to be disposed as in *E. discriminata*. Spines of the genitalia yellow. Legs wholly

black, with black hairs and bristles. Pattern of the wings as in *dimidiata*; shape of discal cell intermediate between *dimidiata* and *discriminata*; first posterior cell less narrowed at the end.

Type ♀ and another ♀ specimen from West Nyasa, Vitiya and Mzimba, June and October 1909 (*Dr. H. S. Stannus*).

58. *Exoprosopa argyrophora*, sp. nov. (Plate L, fig. 17.)

♂. Length of the body 9 mm., of the wing 8 mm.

A very small species near *E. dimidiata*, but distinguished by its silvery abdomen. Head black, with scanty pubescence and black hairs on the frons. Face short, conical; proboscis not projecting; antennae with the two basal joints black, the first with black hairs and short, third joint wanting. Thorax black and black-haired, with some grey hairs on the collar. Scutellum black, dark reddish at the hind edge. Halteres with a white knob. Abdomen black, the venter and the sides of the second to the fourth segments are yellowish; first segment with white hairs on the sides; second, third and fourth segments all covered with dense silvery scales and with white hairs on the sides; the remaining segments are black, with sparse white scales and black hairs. Legs black, the tibiae dark reddish; hind claws short and with a small tooth. Wings as in *E. dimidiata*, but the black pattern more narrowed, filling only the basal third of the discal cell; direction of the veins as in *sigmoidea*, but the discal cell is more regular and its exterior cross-vein is not S-shaped.

Type ♂, from West Nyasa, Momberas district, November 1909 (*Dr. H. S. Stannus*); a single specimen.

59. *Exoprosopa argentifrons*, Macquart (1855). (Plate L, fig. 18.)

A single specimen from West Nyasa, May 19, 1909 (*Dr. H. S. Stannus*), which agrees well enough with the description. The first joint of the antennae and the legs are red; the marking on the wing is more brown than black.

This and the following species belong to the group D of Loew; but I think that they are best placed with *E. dimidiata*.

60. *Exoprosopa scaligera*, sp. nov. (Plate L, fig. 19.)

♂. Length of the body 10 mm., of the wing 10 mm.

Allied to the preceding species, but distinguished by the shorter antennae and the different shape of the wing-marking.

Head black, dark reddish on the face, which bears whitish scales;

frons black-haired and with two black cross-bands. First joint of the antennae short, black and black-haired; third joint in the shape of a short cone, of a greyish colour, bearing a style longer than the joint itself. Face projecting, the proboscis not projecting. Thorax black, with yellowish pubescence and with black hairs on the sides anteriorly; mesopleurae with hairs of amaranthine colour; metapleural tuft with white and below with black hairs. Squamulae dark, with a whitish fringe; halteres with yellow knob. Scutellum black, with red margin and black bristles. Abdomen black, the second and third segments narrowly reddish on the sides; pubescence black, white and yellow; hairs on the sides alternately black and white. Legs dark reddish, black on the knees and on the last joints of the tarsi. Wing-pattern like that of *E. ignava*, Loew, but with more indentations at the third, fourth and sixth longitudinal veins; the upper corner at the discal cell is hyaline, and in this the species differs from all the others of the group D. Origin of the second vein a little before the small cross-vein; first posterior cell broadly open, second and third of equal width, fourth broader than the others; a short stump in the discal cell before the lower apical corner.

Type ♂, from West Nyasa, Ekwendeni (*Dr. H. S. Stannus*); a single specimen.

61. *Exoprosopa jacchoides*, sp. nov. (Plate L, fig. 20.)

♂. Length of the body 13 mm., of the wing 12 mm.

A black species, with extensive black markings on the wings, recalling that of *E. jacchus*; the first abdominal segment bears on the sides tufts of black hairs (not white, as usual).

Head black: frons black-haired, the dark yellow tomentum forming a cross-band towards the middle. Antennae entirely black, the two first joints black-haired, the third of short conical shape, as long as the style. Face strongly projecting; proboscis as long as the mouth. Thorax black and clothed with predominantly black hairs, those on the collar being yellow; bristles black; pleurae black-haired, the metapleural tuft entirely black. Squamulae dark brown, with a white fringe, which is brownish in its exterior angle; halteres dark, with whitish knob. Scutellum black, reddish at the hind margin, with black bristles. Abdomen black, reddish towards the sides and at the apex; the first and the following segments bear on the sides black hairs only; white scales are to be seen on the sides of the second, fourth, fifth and sixth segments, the third bearing an entire cross-band and the seventh being entirely covered with these scales; there are also black scales in the middle of the

segments ; genitalia dark yellow ; venter dark, with black and pale hairs. Legs dark reddish, with black pubescence and black bristles. Wings with black veins ; discal cell twice as long as broad, narrowed towards the middle, obtuse at the end ; first posterior cell little narrowed. The wings are blackened from the extreme base to the end of the first longitudinal vein ; from here the border runs obliquely and sinuously to the vein dividing the second from the third posterior cell at the hind margin of the wing; apex of the first submarginal cell hyaline, as also the apical half of the second posterior cell ; a small hyaline oblique spot in the discal cell before its end; third and fourth posterior cells each with a hyaline spot near the hind margin, which are fused together and in contact with the spot in the discal cell; apex of the axillar cell subhyaline. There are small yellowish spots at the cross-veins, chiefly on the small cross-vein and on the base of the second longitudinal vein, which originates a little before it ; prediscoidal spot small, whitish ; small cross-vein placed before the middle of the discal cell.

Type ♂, from Northern Nigeria, Zungeru, February 5, 1910 (*Dr. J. W. Scott Macfie*) ; a single specimen.

62. *Exoprosopa laeta*, Loew (1860).

A very well characterised and elegant species, distinguished by the prevalent yellow colour of the body, the rounded and not projecting face, the brown and yellow pattern of the wings, showing broad pellucid spots on the cross-veins and two broad blackish bands fused together at the hind margin.

A specimen from North Nyasa, Makongwa, February 12, 1909 (*Dr. J. B. Davey*).

63. *Exoprosopa punctulata*, Macquart (1840). (Plate L, fig. 21.)

This species is, without any doubt, the same as that described by Loew under the name of *E. rasa* (1860). It represents the type of a natural group of closely allied species, with which are to be associated the following: *E. major, batrachoides, stannusi* and *capnoptera*. The characters of this group are :—

Abdomen of conical shape, pointed at end ; body elongate, short-haired, without black hairs on the pleurae, and without silvery spots or bands on the abdomen ; face little projecting; third antennal joint of conical shape, bearing a style not longer than itself ; proboscis short. Wings rather narrow and long ; the vein dividing the

second from the third posterior cell much shorter than the inferior vein of the discal cell and not placed on the same line with this; discal cell obtuse outwardly, with the basal angle more or less developed; small cross-vein placed at the middle or a little before the middle of the discal cell, the origin of the second longitudinal vein always taking place before it. Wing-pattern very simple, consisting only of a narrow brownish fore border and some small spots on the cross-veins.

Of *E. punctulata* (= *rasa*) there are in the collection five very similar specimens from North Nyasa, Karonga to Fort Hill, near Chikweta's village, May 31, 1909 (*Dr. J. B. Davey*); also a ♀ specimen taken between Deep Bay and Vua, May 14, 1909, by the same collector. The spines of the female genitalia are yellow.

64. *Exoprosopa major*, Ricardo (1901).

A single specimen from Nyasaland, Marimba, Kambindingo, January 20, 1910 (*Dr. J. B. Davey*), which agrees very well with the description of Miss Ricardo; the original locality was Fort Johnston, also in Nyasaland.

65. *Exoprosopa batrachoides*, sp. nov. (Plate L, fig. 22.)

♂ ♀. Length (of 6 specimens) of the body 18–20 mm., of the wing 16–17 mm., of the wing-expanse 34–40 mm.

A very large and robust species, closely allied to the preceding, but characterised by the red legs and different colour of the abdomen.

Head red, with yellow tomentum; a black spot on the occiput, near the vertex, sometimes wanting; frons with dense yellow pubescence towards the base of the antennae and very few black hairs near the vertex. Antennae short, the two basal joints red, the first bearing yellow hairs; third joint black, a little longer than the style. Proboscis black, little projecting; hind margin of the eyes very broad. Thorax black, clothed with short yellowish-grey hairs, absolutely without any black hairs, the bristles alone being black. Squamulae very large, dark red, with a yellowish fringe; halteres with whitish knob and reddish stalk. Scutellum red, with a complete row of strong marginal black bristles. Abdomen entirely red, without black cross-bands; there are rounded basal black spots in the middle of the second, third and fourth segments, which are of decreasing size; the first segment is black, with lateral tufts of whitish hairs. Venter covered with whitish tomentum. The hairs of the abdomen are very short and greyish, with scattered black hairs on the sides

near the hind margin of the segments ; last segment with a very dense marginal black fringe. Genitalia of the male of larger size, red, with yellow hairs ; genitalia of the female with red spines. Legs dark reddish, but the tarsi and the hind femora are darkened ; claws red at the base, with a red tooth ; bristles and pubescence black. Wings hyaline, with yellowish veins, which are darkened only near the end ; basal comb very large, dark reddish and with a short black fringe ; the base and the costal cell brownish ; the subcostal and the first basal greyish ; the small cross-vein and those on the base of fourth and third posterior cells (this last only near the extreme base) are narrowly margined with fuscous. First posterior cell a little narrowed at the end, the three others of almost equal width ; the first posterior cell is very narrowed near the base ; the nervure dividing the discal from the third posterior cell is very sinuous ; small cross-vein placed in the middle of the discal cell.

Type ♂ and ♀, and three additional specimens from North Nyasa, near Deep Bay, October 3 and 4, 1909 (*Dr. J. B. Davey*) ; another ♀ specimen from Nyasa, October 21, 1910 (*Dr. J. E. S. Old*).

66. *Exoprosopa stannusi*, sp. nov. (Plate L, fig. 23.)

♂. Length of the body (of 5 specimens) 15–16 mm., of the wing 14–15 mm.

A species also near *E. major*, but with red legs ; distinguished from the preceding by the smaller size and the black antennae.

Head black, reddish only on the face, on the lower portion of the frons and along the margins of the mouth ; hairs of the face yellow, those on the frons black ; antennae short, black, the first joint clothed with black hairs ; the third greyish, conical, with the style a little shorter. Proboscis black. Thorax black, with yellowish hairs and some black hairs in the middle of the back ; bristles black ; squamulae yellowish and with a yellow fringe ; halteres whitish. Scutellum black, with black marginal bristles. Abdomen yellowish-red, with grey pubescence ; venter concolorous ; a broad median black stripe which extends from the first to the sixth segment ; moreover there are black cross-bands, with black tomentum at the hind margin of the segments ; the hairs along the sides are pale, but there is a tuft of black hairs on a line with the black cross-band of each segment ; last segment with a black fringe. Genitalia red, with yellow and black hairs. Legs paler yellowish-red, the tarsi darkened and the claws with a red tooth ; knees black ; bristles black, but the tomentum is yellowish. Wings greyish hyaline, the base and the fore border to the fourth longitudinal vein, extending

obliquely from the end of the second vein to the small cross-vein, dark brown. Isolated brown spot and shape of the cells as in *E. batrachoides*.

Type ♂ and four additional specimens from West Nyasa, Viyiya and Limpachi River, October and November 1909, all collected by *Dr. H. S. Stannus*, in whose honour the species has been named.

67. *Exoprosopa capnoptera*, sp. nov. (Plate L, fig. 24.)

♀. Length of the body 18 mm., of the wing 17 mm.

Very near the preceding and perhaps the female of it; but it seems to be distinct, being darker and having different wings.

The hairs on the collar and on the sides of the thorax are golden, not grey. Halteres with blackish knob. Abdomen black, being only narrowly reddish on the sides; the hairs of the sides are all black, only the basal tuft of the first segment being, as usual, white. Spines of female genitalia dark yellow. Legs dark red, the coxae and the tibiae being in part blackened. Wings uniformly clouded with a clear brownish-black tint, the base and the costal cell being yellowish-brown; cross-veins very lightly margined with fuscous. Wing-veins as in *E. batrachoides*, but the first posterior cell broadly open and the vein dividing the discal from the third posterior cell less sinuous.

Type ♀, from West Nyasa, hills, October 1909 (*Dr. H. S. Stannus*); a single specimen.

68. *Exoprosopa penthoptera*, sp. nov. (Plate L, fig. 25.)

♂ ♀. Length of the body (of four specimens) 13–14 mm., of the wing 13–14 mm.

In the venation this species agrees with those of the *punctulata* group, but differs in the shape of the abdomen, which is not conical.

Head black, narrowly pale yellow along the mouth edges alone; face rounded, not projecting; hairs black. Antennae with the first joint black and black-haired, the second reddish, the third dark reddish, of elongate conical shape, bearing a short style. Thorax black, the hairs of the sides yellow, those on the pleurae also, with some black hairs intermingled; metapleural tuft yellow; squamulae dark, with a yellow fringe; halteres with whitish knob. Scutellum black, with reddish margin and black marginal bristles. Abdomen entirely black, on the underside also; it is not well preserved, but it seems to be clothed with whitish tomentum and black hairs, the lateral tufts of the first segment being white. Legs black, the tibiae dark

yellowish ; claws yellow at the base, with a small tooth. Wings broad and long, greyish hyaline, the anterior half darkened, its limits being irregular and not sharply defined ; the veins are a little margined with fuscous. Venation as in the preceding species, but the origin of the second longitudinal vein opposite to the small cross-vein ; the first posterior cell is, moreover, not so narrowed at the base.

TYPE ♂ and ♀, and two additional specimens from North Nyasa, bush near Wovwi stream, November 27 and 28, 1909 (*Dr. J. B. Davey*).

69. *Exoprosopa heterocera*, sp. nov.

♀. Length of the body 11 mm., of the wing 10 mm.

A black species with unspotted wings, readily distinguished by the colour and the shape of the third antennal joint, which approaches to that of the species of *Thyridanthrax* of the group represented by *T. elegans*.

Head black, with white tomentum and with black erect hairs on the frons ; face projecting, with white hairs on the sides ; occiput with argenteous scales at the margins of the eyes ; proboscis black, not projecting. Antennae with the first two joints short, black, the first with short black hairs ; third joint very long, more than twice the first two together, of linear shape, not pointed, obtuse at the tip, with a very minute less distinct style ; its colour is yellow, darkened towards the end. Thorax black, with grey hairs and black bristles ; hairs on the pleurae white. Halteres black, with the knob white below. Scutellum black, yellow at the margin. Abdomen black, with white tomentum ; first segment with tufts of white hairs on the sides ; spines of the female genitalia long, dark yellow. Legs black, black pollinose and with black spines ; hind claws small, yellow at the base, with a small tooth. Wings uniformly smoked, the second posterior cell and the base of the discal cell being a little more clear ; base and costal cell yellowish-brown, first basal cell and the middle of the subcostal cell darkened. Small cross-vein placed before the middle of the discal cell, the second longitudinal vein beginning opposite it ; first posterior cell a little narrowed at the end, second and third of almost equal width ; discal cell not broader than the second basal cell, which equals it in length ; third posterior cell very short. Veins yellow towards the base, blackish at the end ; basal comb black, very small.

TYPE ♀, from North Nyasa, Marimba, near Chia River, January 21, 1910 (*Dr. J. B. Davey*) ; a single specimen in not very good condition.

70. *Exoprosopa villaeformis*, sp. nov.

♂ ♀. Length of the body (of 6 specimens) 17 to 18 mm., of the wing 16 to 17 mm., of the wing-expanse 36 to 38 mm.

A robust species of larger size, with entirely hyaline wings, much resembling a *Villa*.

Head black, the frons, with exception of the vertex and the face, reddish ; mouth edges whitish ; occiput near the indentation of the eyes with a broad band of silvery scales ; frons with yellowish, face on the sides with silvery, tomentum ; the frons bears short but dense erect black hairs ; the face shows white hairs on the sides. Face rounded, not projecting ; proboscis not projecting ; frons of the female at the vertex one and a half times broader than that of the male at the same point. Antennae very far apart from each other and very short; the two basal joints are black (or, when denuded, reddish), of equal length, the first bearing very short black hairs ; third joint onion-shaped, the broad portion not longer than the first two joints together and as long as the styliform portion ; the style almost as long as the whole antenna. Thorax black, reddish on the sides; the hairs on the collar and on the sides are yellow, those on the base of the wings are white ; bristles black ; hairs on the pleurae entirely white. Squamulae yellow, with a white fringe ; halteres yellowish. Scutellum reddish, with black marginal bristles. Abdomen black, reddish on the sides and on the venter ; there are on the segments cross-bands of black, yellow and whitish tomentum ; the hairs of the sides are alternately black and white ; venter clothed with white scales and hairs. The form of the abdomen is characteristic ; it is flattened, of rectangular outline, but the last segments are contracted, forming a cone ; male genitalia symmetrical ; spines of the female genitalia blackish. Legs red, whitish pollinose and black spinose; tarsi and tibiae somewhat darkened ; hind claws with a small tooth. Wings hyaline, the base narrowly yellowish and the costal cell yellowish-grey ; origin of the second vein opposite or a little before the small cross-vein, which is placed before the middle of the discal cell ; third posterior cell very long; second basal cell short and broad. Basal comb very large and yellow, like that of *Villa*.

Type ♂ and ♀ and four other specimens from North Nyasa, Deep Bay, Kaporo, Wovwi River and Mwiniwanda Valley, October to November 1909 (*Dr. J. B. Davey*).

71. *Exoprosopa minois*, Loew (1869).

Some specimens from North Nyasa, Nyungwi stream and Lake shore, October to November 1909 (*Dr. J. B.*

Davey), which agree well enough with this Mediterranean species.

72. *Exoprosopa hypomelaena*, sp. nov.

♀. Length of the body 10 mm., of the wing 8 mm.

A small species with hyaline wings, very closely allied to the preceding but differing in the following points.

Third antennal joint broad at the base, afterwards attenuated into a point, which ends in a style as long as this point. Lower half of pleurae and breast clothed with black hairs. The four front tibiae are yellow. Wings with the base and the costal cell only a little grey, almost hyaline ; the direction of the veins is the same, but the anal cell is more narrowed at the end.

Type ♀, from West Nyasa, Chinktu, October 1909 (*Dr. H. S. Stannus*) ; a single not well preserved specimen.

73. *Exoprosopa* (?) *inornata*, Loew (1860).

A single specimen of very doubtful determination, from West Nyasa, Limpachi River, November 1909 (*Dr. H. S. Stannus*).

74. *Exoprosopa* sp. indet.

A single badly preserved and wholly denuded specimen of a species very near *E. iris*, Loew, from North Nyasa, Fort Hill, September 26, 1909 (*Dr. J. B. Davey*).

16. *Hyperalonia*, Rondani (1863).

This genus seems to be somewhat plentiful in South Africa; in the collection there are four species, which belong to two very distinct groups.

The first group embraces the species which have red, more or less darkened, legs and extensive brown markings on the wings, which are often all darkened and with strong metallic reflections. Hind claws with an obtuse tooth. Discal cell very much twisted, pointed outwardly, the vein dividing it from the second posterior cell being very sinuous and placed almost in the same direction as the axis of the wing ; second posterior cell broader at base than at apex. To this group belongs the species *H. rufa*, Wied., from the Cape; *vittata*, Ric., from Nyasa ; *nigripennis*, Loew, from Mozambique; *helena*, Loew, from Egypt, and *venus*, Karsch, from Zanzibar.

To the second group belong the species which have

black legs, the tibiae more spinose and with longer spines, the hind claws with an obtuse tooth which it is often very difficult to see; the wings are hyaline or with much less developed markings. The discal cell is not twisted, in the shape of a trapezium, and the vein dividing it from the second posterior cell is straight and almost perpendicular to the longitudinal axis of the wing; second posterior cell broader at apex than at base. The species are *H. sisyphus*, Fabr., from Guinea; *alula*, Bezzi, from Erythraea; and perhaps *monacha*, Klug, from Arabia.

The species in the collection can be distinguished as follows:—

1 (6). The vein dividing the discal from the second posterior cell is very sinuous, oblique and almost of equal length with that dividing the same cell from the third posterior cell; wings with extensive black markings or all darkened.

2 (5). Wings entirely darkened or blackish; second basal cell with a very small whitish spot in the upper corner, which often is very indistinct.

3 (4). Head, abdomen, basal joints of the antennae and legs red, wings brown, with the cross-veins shaded . *vittata*, Ric.

4 (3). Head, abdomen, antennae and legs black; wings blackish, with the cross-veins not distinctly shaded *nigripennis*, Loew.

5 (2). Wings broadly hyaline at apex and towards the axillar cell; second basal cell with a very large subquadrate hyaline spot, which extends over almost all its apical half *thyridophora*, sp. n.

6 (1). The vein dividing the discal from the second posterior cell is straight, almost perpendicular, and very much shorter than that dividing the same cell from the third posterior cell; wings entirely hyaline, with a narrow brown fore border along the costal cell . . . . *sisyphus*, Fab.

75. *Hyperalonia vittata*, Ricardo (1901).

Ten specimens of this species, which seems to be common in Central Africa; they agree very well with the description of Miss Ricardo, and one was besides compared with the type by Mr. E. E. Austen. The great variation in size of this species has already been mentioned by Miss Ricardo; of the specimens here recorded, the largest measures 19 mm. in length of the body and about 40 mm. in wing-expanse; the smallest 11 mm. and 24 mm. respec-

tively. I think that the distinction of *H. vittata* from *rufa*, Wied., is not an easy matter.

Five specimens from North Nyasa, Kaporo, Deep Bay and Mwiniwanda, June and October 1909 (*Dr. J. B. Davey*); three specimens from Northern Nigeria, Zungeru, November 5, 1910 (*Dr. J. W. Scott Macfie*), and Dinia River, November 26, 1910 (*J. J. Simpson*); two specimens from Uganda, Oeta, December 15, 1910 (*C. C. Gowdey*). The type-locality was Fort Johnston in Nyasaland.

76. *Hyperalonia nigripennis*, Loew (1852).

A single specimen from Northern Nigeria, Gau, December 17, 1910 (*J. J. Simpson*). This species seems to be widely spread over Central Africa, as I have seen also a specimen from the Belgian Congo. Basal comb of the wing black. All the hairs of the sides and underside of the thorax and abdomen are of a golden yellow colour, which renders them conspicuous on the black ground-colour of the body. The metallic reflections of the wings are very strong, and in this the species agrees with *H. helena*, Loew, of which I have seen specimens from Erythraea.

77. *Hyperalonia thyridophora*, sp. nov. (Plate L, fig. 26.)

♀. Length of the body 18 mm., of the wing 20 mm., of the wing-expanse 44 mm.

A very distinct species, which I shall name, although the single specimen is without a head. The wing-pattern recalls that of *H. venus*, Karsch (1887), which has also a large hyaline spot in the second basal cell; but this last species shows also hyaline spots in the discal, anal, and third and fourth posterior cells, which are wanting in my species. The re-description of the species given by Speiser in 1907 seems to apply to some different species, perhaps of the group of *E. apicalis*, Wied.; at least in the species to be described here the tibiae are not pennate.

Thorax black, clothed with grey hairs and with some scattered black hairs on the sides; collar and pleurae with entirely yellowish grey hairs, also on metapleural tufts; bristles black. Squamulae yellowish, with a white fringe; halteres black, with paler knob. Scutellum dark red, narrowly black at base, with marginal black bristles. Abdomen black, the segments being narrowly yellowish at the hind border; hairs of the colour of those on the thorax, but each segment bears on the sides at the hind margin some black hairs, which are more numerous on the last segments; under the hairs

there is whitish tomentum. Venter black, the first segment reddish, clothed with short whitish hairs; spines of the female genitalia yellowish red. Legs black, the tibiae reddish, with black pubescence and black spines; hind claws with a very small tooth. Wings blackish brown, the apex broadly hyaline; the limit of the black marking runs outwards from the end of the costal cell over the apex of the first sub-marginal to the apex of the third posterior cell at the hind margin. There are less distinct pale clouds on the apex of the discal cell, on the third and fourth posterior cells and on the middle of the anal cell; the axillar cell is entirely hyaline; the large hyaline spot in the second basal cell is very conspicuous. Basal comb of a dark reddish colour and with black pubescence. Origin of the second longitudinal vein a little before the small cross-vein, which is placed at the middle of the discal cell; first posterior cell very narrow in its whole length and narrowed at the end; second and third of about equal width at the apex, the fourth being broader; discal cell very pointed outwardly, the vein between it and the second basal cell being sinuous; this last cell is in shape an almost regular rhomb, the vein dividing it from the third being almost straight, not sinuous as in *H. vittata*. The wings are longer than in the allied species.

A single specimen, without head, from Nyasaland, Dowa (*Dr. J. E. S. Old*).

78. *Hyperalonia sisyphus*, Fabricius (1805).

A very distinct species, not recognised as *Hyperalonia* in the Catalogues.

My *H. alula* (1906) from Erythraea is an allied species, characterised by the argenteous bands on the abdomen and the brown clouds on the wings.

Six specimens from North Nyasa, Deep Bay to Vua, and Bundi village, Fuliwa, May 13–14, 1909 (*Dr. J. B. Davey*); two other specimens from Fort Johnston, June 12, 1910 (*Dr. A. H. Barclay*).

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Explanation of Plate L.

[*See Explanation facing the* Plate.]

Explanation of Plate L.

Fig.

1. *Systoechus robustus*, sp. nov. $\frac{3}{2}$.
2. *Lomatia gigantea*, sp. nov. $\frac{6}{5}$.
3. *Anthrax homogeneus*, sp. nov. $\frac{5}{2}$.
4. „ *camptocladius*, sp. nov. $\frac{5}{3}$.
5. *Thyridanthrax macquarti*, sp. nov. $\frac{2}{1}$.
6. „ *melanopleurus*, sp. nov. $\frac{3}{2}$.
7. *Isotamia* (gen. nov.) *daveyi*, sp. nov. $\frac{6}{5}$.
8. *Litorrhynchus basalis*, Ric. $\frac{1}{1}$.
9. „ *nyasae*, Ric. $\frac{3}{2}$.
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13. „ *tollini*, Lw. $\frac{4}{3}$.
14. *Petrorossia gratiosa*, sp. nov. × 3.
15. *Exoprosopa discriminata*, sp. nov. $\frac{3}{2}$.
16. „ *luctifera*, sp. nov. $\frac{3}{2}$.
17. „ *argyrophora*, sp. nov. $\frac{3}{2}$.
18. „ *argentifrons*, Macq. $\frac{2}{1}$.
19. „ *scaligera*, sp. nov. $\frac{2}{1}$.
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25. „ *penthoptera*, sp. nov. $\frac{3}{2}$.
26. *Hyperalonia thyridophora*, sp. nov. $\frac{1}{1}$.

H. Knight del. *C. Hentschel.*

AFRICAN BOMBYLIIDAE.

XXVIII. *Parthenogenesis in Worker Ants, with special reference to two colonies of* Lasius niger, *Linn.* By W. C. Crawley, B.A., F.E.S.

[Read November 1st, 1911.]

It is generally assumed, according to the theory of Dzierzon, that unfertilised eggs of the honey-bee always develop into ♂s, and fertilised eggs into ☿s and ♀s. Eggs laid by worker bees, which have no spermatheca, will therefore produce ♂s only.

This theory has been applied by some authors to ants, without sufficient investigation. It is a well-established fact that ☿ ants lay eggs. Lespès (1863) indeed asserted that such eggs never came to maturity, but Forel (1874) records ☿s of *Formica sanguinea* laying eggs which produced ♂s. Denny showed that ☿s lay eggs, and Dewitz (1879) maintained that the ☿s habitually lay eggs.

Lubbock (1890) carried out careful observations on queenless colonies of *Formica cinerea*, *F. fusca*, *Polyergus rufescens*, and *Lasius niger*, and found that eggs were laid by the ☿s, but only ♂s were produced from these eggs. In colonies of *F. fusca*, and *F. sanguinea* with *fusca* slaves, I have often observed the ☿s to lay eggs, but no ♂s came to maturity in any of the nests, and the *sanguinea* ☿s appeared to devour most of the eggs almost as soon as they were laid. The first indication that eggs laid by ☿ ants might produce ☿s as well as ♂s seems to be in a paper by Reichenbach (1902). Reichenbach obtained some three hundred ☿s and two or three dozen ♂s from the eggs laid by a small queenless colony, containing only a few ☿s, of *Lasius niger*. Mrs. Comstock (Wheeler, 1903), obtained similar results with *L. niger* var. *americanus*.

In a recent paper (1909) Janet criticises Reichenbach's experiment, suggesting that he should repeat it, taking the most minute precautions against error. Janet himself made attempts to obtain ☿s from ☿ eggs with no less than thirty queenless colonies of several species, under

varying conditions and food supply, but in every case where the eggs came to maturity they were ♂s.

On reading these papers it occurred to me that certain hitherto inexplicable phenomena mentioned in a paper some years ago (Crawley, 1900) might be explained by this fact of worker-eggs producing ☿s. In 1896 I had a fair-sized colony of *Lasius niger* in captivity. This colony lost its queen through an accident, soon after the ants were established in their "Lubbock" nest. The queen left a large quantity of eggs. To quote from the above-mentioned paper:—"I had at the time (August 1896) a solitary fertile *Lasius umbratus* queen, and finding that when placed in a pill-box with several *L. niger* ☿s she was not attacked, I put her into the queenless nest of *L. niger*. . . . The little black ants received her eagerly, and she was very shortly established as queen of the nest. . . . During the year 1897 all the eggs and larvae left by the old *niger* queen hatched, the last brood of larvae having lived through the previous winter, *but in that year and the next*, though I paid careful attention to the nest, *I was unable to trace any of the offspring of the L. umbratus queen to maturity*. As the ☿s of *L. umbratus* are bright yellow, and those of *L. niger* are black, there is no possibility of confusing the two." I may mention that I had observed the *umbratus* queen lay eggs during 1897, and numbers of larvae lived through the winter of 1897–8, yet during 1897 and 1898 all the ants (several hundred ☿s) that reached maturity in the nest were *L. niger*. The *niger* ☿s must therefore have devoured the *umbratus* eggs or larvae, which is not surprising, since in 1899, when the *umbratus* eggs were at last allowed to reach maturity, the young ☿s were all killed and eaten, or divided among the larvae as food, by the *niger* ☿s, within a few days of hatching. The queen used to spend a long time licking the eggs and larvae, an unusual proceeding for a queen ant.

At the end of the paper I wrote that this acceptance of an alien queen by a queenless colony of another species might throw some light on the origin of slavery among ants. This has now been demonstrated by Wheeler and Wasmann.

In another paper (Crawley, 1909) before describing the second similar case of *L. niger* and *umbratus* of 1908, I recapitulated the principal facts of the 1896 colony, with a few important additions from my notebook:—"No eggs

were laid by the queen in 1896 (in my experience the ♀s of *L. umbratus* do not lay till the year following impregnation), and the *niger* larvae left by the old queen lived through the winter and began to change into pupae at the beginning of June 1897. On June 26th the *umbratus* queen began to lay, and by August 1st there was a large quantity of eggs laid by her" (and also, as the results show, by the *niger* ☿s). "The larvae from these eggs lived through the winter. On May 31st, 1898, the first larva in the nest changed into a pupa, and by the end of July there were about one hundred pupae in the nest. On August 2nd twenty pupae hatched, the young ants all being *L. niger* ☿s." This result being inexplicable to me, as I took it for an established fact that if eggs had been laid by the *niger* ☿s the resulting perfect insects would have been ♂s, I tried to explain it by assuming an error in my records, as follows:—"It is clear that there is an error in my records here, for it is hardly possible that larvae from *niger* eggs laid in 1896 could have lived till 1898 before completing their metamorphoses. I have recorded giving the nest some *niger* pupae on August 6th, but some must have been given to the nest before August 2nd." However, in view of the identical results obtained with the other similar colony from 1908 to 1910, where there was no possibility of error, I think that there was no mistake here, and that the results were due to parthenogenetic eggs laid by the *niger* ☿s producing ☿s. The following year, 1899, hundreds of *L. umbratus* ☿s came to maturity in the nest, and were all, as stated above, killed by the *niger* ☿s. No *niger* ☿s appeared after 1898. In 1900 the *umbratus* ☿s began to hatch in July, and this time were not molested by the *nigers*, and by July 18th there were twenty alive and carrying pupae about the nest. This interesting colony unfortunately came to an untimely end, as I was obliged to leave it in other hands for more than two months, and found on my return all the ants dead except the queen, who died shortly afterwards. There was not a single *niger*, or remains of one, to be found in the nest, though there were hundreds of dead *umbratus* ☿s.

During the four years this colony was in my possession *not a single ♂ of either species made its appearance.*

Again, in September 1908, I had a queenless colony of *L. niger* which accepted a fertile *umbratus* ♀ as queen on September 19th. I was determined that there should be

no possibility of any error in this case, and the most careful records have been kept. This colony had no brood of any kind, so to occupy the numerous ☿s I gave them some *niger* eggs. All these eggs became larvae before November 1908, and no eggs were laid by the *umbratus* queen or the *niger* ☿s during that year. By the end of April 1909 most of these *niger* larvae were more than half-grown, and a few nearly ready to pupate, and on May 4th there were seven eggs in the nest. I did not see them laid, so was not certain whether they were workers' or the queen's eggs. On May 7th, however, the abdomen of the queen was considerably swollen, and I observed her in the act of laying. From this time till late in June I repeatedly saw her depositing eggs, though I never succeeded in seeing a *niger* ♀ doing so. The first *niger* larva pupated on May 12th, and on the 30th there were over fifty pupae. The queen was often seen to lick the eggs herself, but none hatched till June 20th, when I observed a number of very small larvae. This was about six weeks after the first eggs were laid.

On June 25th there was a fair number of these small larvae side by side with the eggs. From July 11th till August 9th, 1909, the nest was under the care of Mr. A. H. Hamm, of the Oxford University Museum, who took special care that no eggs, larvae or pupae of any species were introduced into the nest. On August 9th, when I took back the nest, the queen had apparently ceased to lay, as her abdomen was its normal size; and there were numbers of larvae of all sizes, a few changing into pupae, and several newly-emerged *niger* ☿s. I observed numbers of *niger* ☿s hatch daily till August 24th, by which time there could have been very few, if any, of the last year's *niger* larvae which had not already pupated, as all the remaining larvae in the nest were small. From August 24th till October 3rd, 1909, during my absence in America, Mr. Hamm again most kindly took charge of the nest, and assures me that no young of any species of ant was put into the nest.

The nest contained, on my return, many half- and three-quarter-grown larvae (in which condition they passed the winter), a few pupae, and a large quantity of eggs, much larger than had been in the nest on August 24th. As the queen had to all appearance ceased laying by that date, many of these eggs may have been laid by the *niger* ☿s.

There was no sign of *umbratus* ☿s. The last pupa came to maturity on October 22nd, 1909, and was a *niger* ☿. No males had appeared.

The colony passed the winter of 1909–10 in good condition, the larvae, as usual, remaining unchanged in size till the beginning of April 1910. On the 5th of that month one larva was nearly full-grown, but it was not till May 22nd that eleven larvae spun their cocoons. The following day this number had increased to twenty, and to more than sixty on the 24th.

The *umbratus* queen began to lay again on May 26th, some three weeks later than the previous year, but she laid many more eggs, and her abdomen became greatly distended.

Finally, on July 2nd, 1910, the first pupae hatched. There were six newly-hatched ☿s of a pale grey colour at 11.25 p.m. The following day the young ants had not quite attained their full colour, but they were unmistakably *niger*. On July 7th there were between fifty and sixty newly-hatched ☿s, none being *umbratus*. On the 17th I took a number of these young ☿s, some still pale, and some nearly full-coloured ones, and a few of the old *niger* ☿s, and sent them to Dr. Forel for identification. A few days later I received an answer from him stating that all the ants I had sent him were *Lasius niger purus*, and drawing my attention to Reichenbach's paper mentioned above.

By August 14th, 1910, all the pupae had hatched, and there were about 100–200 eggs, many small larvae, and two or three half-grown larvae. All the new ☿s were of a uniform size, somewhat smaller than the normal *L. niger*.

During last autumn I talked the matter over with Mr. H. Donisthorpe, who kindly communicated with Father Wasmann. In his reply, Wasmann suggested having some of the ☿s dissected to see if any of them possessed a *receptaculum seminis*. Mr. G. H. Grosvenor, of the Oxford University Museum, very kindly undertook this task, and dissected twelve ☿s of various sizes from the colony. In none of them was there a *receptaculum seminis*.

There can be little doubt that we have to deal here with a genuine case of parthenogenesis, confirming Reichenbach's experiment, and helping to prove that eggs laid by ☿s of some species can produce ☿s and not ♂s. It is note-

worthy that not a single ♂ has been produced in either colony.

The further history of this colony, together with that of the former one, tends to show that the egg-laying capacity of the ☿s is not of very long duration, lasting two seasons at most, while the life of the ☿ may be from three to seven years.

The first eggs of this year were laid on May 10th, sixteen days earlier than in 1910, and the first larva (from last year's eggs) reached the pupal stage on May 30th, and on June 7th there were about fifty pupae. On July 11th I found four callows in the nest, all of a yellow colour, and unmistakably *L. umbratus*. On the 15th there were over thirty. By July 27th this number had increased to over one hundred, and there was no sign of any hostility towards them on the part of the *niger* ☿s.

It is curious that while the young *umbratus* ☿s devoted their attention almost entirely to the care of the larvae, the *niger* ☿s alone surrounded the *umbratus* queen.

At the present moment (October 12th, 1911), the *umbratus* ☿s, as far as can be judged, slightly outnumber the *nigers*, and the latter still pay more attention to the queen than the ants of her own species. Not a single *niger* has hatched in the nest this year. From the number of the larvae, presuming these to be exclusively *umbratus*, as is almost certain, the *niger* population of the colony will be outnumbered by at least four to one next year.

Allowing for the increased mortality among the more active *niger* in nature, it would seem that it takes four to five years for a colony founded in this way to become exclusively *umbratus*. In this particular colony the total number of deaths from natural causes among the *niger* from September 1908 to September 1911 was 416, and there are still over 300 *niger* ☿s alive in the nest.

It has been suggested by Wheeler (1909) that the usual sterility of ☿s is influenced by their being constantly in a state of semi-starvation, nearly all the food they obtain being given to the larvae. Thus in the second colony (No. 2) the workers were without larvae to tend from July to October 1908, and therefore all the food was consumed by them. But in the first colony (No. 1) this was not the case, as the nest contained larvae from the first.

It appears also that in certain species when a colony is deprived of its queen several workers become fertile. It

is possible that the presence of an alien queen with delayed fertility might bring about a similar result, since the queens of *L. niger*, which found their nests themselves, begin to lay a few days after impregnation, whereas the queens of *L. umbratus* do not lay for eight or nine months after.

I wish here to express my cordial thanks to Mr. Donisthorpe for his valuable help with the bibliography, and in getting the dissections done. The latter was of great importance, as it proved that the ♀s could not have been fertilised.

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XXIX. *Experiments on the Formation of Colonies by* Lasius fuliginosus ♀♀. By Horace St. J. K. Donisthorpe, F.Z.S., and W. C. Crawley, B.A.

[Read November 15th, 1911.]

In a paper read at the meeting of the Entomological Society of London on December 7th, 1910, Donisthorpe stated that it was our intention to carry out experiments with queens of *Lasius fuliginosus* and observation nests of *L. umbratus*. This we have now done, and the following paper shows the results of our investigations. Our object was to find out if small *umbratus* colonies would accept *fuliginosus* ♀♀ as their queens. We may state at once that in this we have been quite successful. It may, however, perhaps be as well to recapitulate the facts that led us to make this inquiry, before giving the details of our experiments.

In 1908 de Lanoy published the fact that he had found in 1904 at Knoche-sur-Mèr in Belgium, a large colony of *Lasius fuliginosus* in which workers of *L. mixtus* (a subspecies of *umbratus*) were present, and that subsequently in 1906 he had found several other colonies of *fuliginosus* containing *mixtus* workers.

Forel and Emery then expressed the opinion that the meaning of the presence of these strange workers was that a fertile ♀ *fuliginosus* had entered a nest of *mixtus* to found her colony; that she had been accepted by the workers of the latter, and that the *mixtus* ♀ had either died or been killed. In the course of time, the *fuliginosus* brood being reared, the *mixtus* workers had died off, and the few found in the nest were the last survivals of the original *mixtus* colony.

In 1909 Wasmann accepted this interpretation, and pointed out that subterranean nests of *mixtus* and *umbratus* are frequently found at the foot of trees close to the nests of *fuliginosus*, and that he had often seen workers of these yellow *Lasius* among the black *fuliginosus*. He urged those naturalists who have the opportunity to make experiments with these ants.

In 1910 Crawley records that in 1898 he frequently saw workers which must have been *umbratus* in a large colony of *fuliginosus*, and that they sometimes saluted each other when they met. Donisthorpe records that in 1897 he found a large colony of *fuliginosus* in a hollow tree at Lymington, and that *umbratus* was living with it, both species coming in and going out together.

Wheeler, when describing an ant from Japan, which he considered might be the β female of *fuliginosus*, refers to the above records, and states that they clearly indicate that this method of colony foundation is actually adopted by *fuliginosus* queens in a manner analogous to that employed by the North American and European *Formicae* of the *rufa*, *exsecta* and *microgyna* groups when they enter nests of *F. fusca* and *incerta*.

In 1911 Donisthorpe points out that *fuliginosus* often founds new colonies by branch nests as in the *rufa* group, which accounts for the fact that in a district where *fuliginosus* occurs, so many colonies are often to be found. He states that the ♀ is unable to found her own colony, and that she enters a nest of *umbratus*, and is accepted by them. He also mentions that on September 20th, 1900, Mr. Tuck of Bury St. Edmunds sent him a worker of *umbratus* taken in a nest of *fuliginosus* in an old horse-chestnut stump in that neighbourhood.

In Switzerland, in May 1905, Crawley observed workers from a colony of *fuliginosus* dragging deälated females back into their nest after the marriage flight. He took a dozen of these ♀♀, and isolated some and put others with ☿☿ from their own nest; but none made any attempt to excavate cells or found colonies in any way, and in a few weeks all had died.

On July 1st, 1910, we dug up a bagful of refuse from a large nest of *L. fuliginosus* in a hollow oak at Darenth Wood. It contained a number of ☿☿, larvae, and a large number of ♂♂ and winged ♀♀. This nest was divided into two portions, each containing an approximately equal number of ♂♂ and ♀♀. During July most of the winged ♀♀, and all the ♂♂, died or were killed by the ☿☿, but about a dozen ♀♀ were found with their wings removed. As some of these ♀♀ subsequently laid a large quantity of eggs, it is highly probable that they had been fertilised in the nest by their brothers. Individuals selected from these deälated ♀♀ were used in our experiments.

On December 8th, 1910, we visited a nest of *umbratus* at Weybridge, which was in the ground under the old root of a tree. This contained a number of ☿☿ and a lot of winged ♀♀, but we were unable to find a deälated queen. It was unfortunate, as it would have been very interesting to prove if the *umbratus* ♀ was killed either by the *fuliginosus* ♀, or her own ☿☿. However, we intend to carry out further experiments when the *umbratus* ♀ is present in a nest.

We took about 400 ☿☿ and 30 winged ♀♀, which we divided into two lots, and established them in two separate "Crawley" plaster nests.

Experiment No. 1.

On December 10th, 1910, a deälated *fuliginosus* ♀ was introduced into the first chamber of *umbratus* nest No. 1. The *umbratus* ☿☿ had already killed and cut up five of their own winged ♀ ♀. The *fuliginosus* ♀ endeavoured to join the *umbratus* ☿☿ at once, forcing her way into the most crowded chamber. One ☿ saluted her, another dragged her by the jaws through the passage into another chamber (☿☿ always drag their own ♀ by the jaws, not by the legs or antennae, when they wish her to move into another place). Eventually she was attacked by many ☿☿, held by the legs and antennae, and was dead in the evening. As will be seen, she was not attacked at once or in the same way as is a strange ant in another nest. For instance, one of the *umbratus* ♀♀ was introduced into the *fuliginosus* nest. She was instantly set upon and killed in a few minutes.

Experiment No. 2.

On December 13th a deälated *fuliginosus* ♀ was put into a small single-chamber plaster nest with a dozen *umbratus* ☿☿ taken from "Crawley" nest No. 1. She was threatened by the ☿☿ with their jaws, and a little attacked. She never tried to run away, but always approached the ☿☿ and endeavoured to conciliate them. She stood still when attacked by a ☿, and stroked and caressed it with her antennae. When a ☿ endeavoured to bite at her waist she protected it by crossing her hind legs over her back, and when at the neck by pressing the head back close against the thorax. By December 20th, the ☿☿ having been increased to 22, and all seeming to be

reconciled to the ♀, she was introduced with them into nest No. 1. A fresh ☿ or two which had not seen her before threatened her with its jaws, and she was a little attacked, but one of the old ☿☿ protected her, getting between her and the others, and pulling them away by the leg.

On December 21st the ♀ was surrounded by a number of ☿☿.

On December 22nd she was observed to be fed by some of the ☿☿ whilst others cleaned her.

On December 23rd one ☿ threatened her with its jaws, and was often pushed away by the others. Another ☿ held her by the leg for some time.

On December 24th another of the *umbratus* winged ♀ was killed by the ☿☿. It may be mentioned that when the *umbratus* winged ♀♀ met the *fuliginosus* ♀ they opened their jaws at her, but did not attack her. When they meet each other they salute in a rather ridiculous manner.

On December 30th the *fuliginosus* ♀ was quite accepted. She was always surrounded by a large group of *umbratus* ☿☿, fed by them, and continually cleaned. She stroked all those near her with her antennae, and seemed perfectly happy and contented.

On March 15th, 1911, we exhibited the two *umbratus* nests at the meeting of the Entomological Society of London, to show that both colonies had accepted *fuliginosus* ♀♀ as their queens.

All went well till April, when a number of the *umbratus* ☿☿ began to die off in nest No. 1. On April 20th a further visit was made to Weybridge, and a large number of ☿☿ were brought home from the old nest, and some 400 were introduced into this nest. The new ☿☿ were quite friendly with the old ones, but unfortunately they attacked the *fuliginosus* ♀. She was removed and isolated with 24 of the new ☿☿. They refused to accept her, and on April 17th she was still being attacked; it was impossible to get her reinstated in the *umbratus* nest.

On April 21st she was returned to her own *fuliginosus* nest. The ☿☿ were much excited, and she was much pulled about. She was eventually lost sight of among the crowds of ants. It is, however, clear that if so many new ☿☿ had not been introduced together into the *umbratus* nest, the *fuliginosus* ♀ would have laid her eggs and brought up her brood in this nest.

On July 13th a number of eggs had been laid in the *fuliginosus* nest, and on the 23rd a ♀ with her abdomen enormously dilated was noticed in the damp chamber of the nest, with a large pile of eggs surrounded by ☿☿.

It may be as well to record that a winged *fuliginosus* ♀, introduced into the *fuliginosus* nest, from Oxshott on June 1st, was at once killed by the ☿☿.

Experiment No. 3.

On December 10th, 1910, at 1.25 p.m., a single *umbratus* ☿ from the Weybridge colony was placed in a glass-topped box with a fertile *fuliginosus* ♀. The ☿ crept up behind the ♀, touched her abdomen with its antennae, then drew back. The ☿ again advanced with open mandibles several times, but did not actually attack the ♀, who remained perfectly quiet. 1.32 p.m. another ☿ was put in, which behaved in a similar manner to the first. One of the ☿☿ examined the ♀, but neither saluted her, though she seemed quite friendly. 1.39 p.m. a third ☿ was put in. 1.41 p.m. by way of contrast a winged *umbratus* ♀ from the same colony was put with them. The ☿☿ saluted her, and the *fuliginosus* ♀ behaved to her just as she had behaved to the ☿☿. Then a ☿ got on the *fuliginosus* ♀'s back and bit savagely at her: she shook off the ☿ and ran away. At 1.50 p.m. the *umbratus* ♀ was removed, and the *fuliginosus* left alone with the three *umbratus* ☿☿. 1.52 p.m. another ☿ was observed to bite at the ♀, who again ran off.

Next morning the four ants were found close together in the box, apparently quite friendly; so at 11.45 a.m. the three ☿☿ were restored to their nest (No. 2 *umbratus* nest), and the *fuliginosus* ♀ put in after them. Ants came up to her with threatening jaws, but did not actually bite her. Later, however, one or two got hold of her legs, but, except in two cases, did not hold on for long. Once an ant saluted her: this may have been one of the three that had been confined with her since the previous day. At 12.30 p.m. a *flavus* ♀ (fertile) was introduced into the nest for comparison. To our surprise she was not at once attacked, but soon a ☿ fixed on her antennae, and held on so persistently that the ♀ was removed. Between 1.9 p.m. and 8 p.m. the *fuliginosus* ♀ was observed to be attacked four times. Whenever she was held by a leg it was interesting to see how patiently she stroked the

assailant with her antennae, which method of conciliation was generally successful. When attacked on the thorax or abdomen she endeavoured to push off the ant with her hind pair of legs.

December 12th, at 9.40 a.m. she was held by an antenna and a leg, but seemed uninjured. Again at 3.30, 3.33, 4.40 and 11.46 p.m. she was attacked and held by legs and antennae, and once a ☿ was seen to pull at the leg of another ☿ who was attacking the ♀. She was so severely attacked that it was considered advisable to remove her with four ☿☿ to a small box for the night. At 7.40 p.m. on December 13th, not having been attacked again, she was restored with the ☿☿ to the nest, and found her way to the innermost chamber where there were most ants. She was observed to be held by ☿☿ on three occasions during the evening. Next day she was observed to caress a winged *umbratus* ♀ with her antennae and tongue at 12.15 p.m. At 7.15 p.m. she was surrounded by ☿☿, one of whom pulled at one of her legs, but another was licking her, and a third saluted her. She caressed the assailant with her antennae and forelegs. Later in the evening other ants were seen to salute her. December 15th, she was attacked three times during the day, but there were generally several ants round her caressing her.

On the 16th she was only attacked once, and the next day she was seen to be on the wall of one of the chambers with a circle of ants round her, behaving as they do to their own queen. There was no sign of any attacking at all.

The whole of the next day, December 18th, she spent in this position, and seemed thoroughly at home. She remained in the same place on the side of the chamber for a whole week. It was curious to compare the calmness with which this ♀ was received by the somewhat phlegmatic *umbratus*, with the excitement with which a colony of *Lasius niger* receives an *umbratus* queen.

On March 22nd, 1911, the ☿☿ in the colony of *fuliginosus* from which the above-mentioned queen had been taken, having nearly all died, a second *fuliginosus* queen was taken and put into the *umbratus* nest at 10.30 p.m. She found her way into one of the inner chambers, but drew back nervously from the first ants she met. They, however, were so friendly that she lost her fear and went among them. Only one or two opened their mandibles

on meeting her, and most saluted her at once. It was a complete and almost instantaneous acceptance. At 10.40 p.m. a *fuliginosus* ☿ was put into the nest. She remained absolutely quiet till 10.56, all the time surrounded by *umbratus* ☿☿. They then began to attack her, and she was removed at 11.10 p.m. A fertile *umbratus* ♀ from a different colony, put in the nest at 10.45 p.m., was not attacked till 10.56, when she was seized by several ☿☿, and so was removed at 11.10 p.m. A *niger* ♀ was introduced at 11.1 p.m., and was almost immediately attacked. At 11.40 p.m. the second *fuliginosus* ♀ found her way to the innermost chamber, and began to caress the original ♀, who was, of course, her sister, and they generally remained together afterwards. The colony now consisted of 157 *umbratus* ☿☿ and two *fuliginosus* ♀♀.

During April 1911, two more *fuliginosus* queens were put into the nest, and were received just as readily as the second. They both belonged to the same colony that the first two had come from. On May 9th one of these two new ♀♀ (which had been in a feeble condition from the first) died. On the 11th, at 8.45 p.m., several *umbratus* ☿☿ from a colony at Wellington College were put into the nest, which, it will be remembered, consisted of ants from a colony at Weybridge. These ☿☿ were received in a perfectly friendly way, so about fifty more were put in, and were also received. At 10.15 p.m. two of the new-comers were attacking one of the three *fuliginosus* ♀♀, and again at 10.25 and 10.40 p.m. It was necessary to compel them to release the ♀. No further attacks were seen that day or the next, so twenty more ☿☿ were put in. One almost immediately began to attack a ♀, and on two other occasions during the day the ♀♀ were attacked. At 4.40 p.m. on May 12th, as the new-comers seemed to have become reconciled to the presence of the alien ♀♀, the remainder of the *umbratus* ☿☿, about thirty in number, were introduced. At 5.6 one ♀ was being pulled by a leg, and at 5.40 another was held by an antenna, but no more attacks were made. Workers from a colony at Woking were also received amicably. On May 19th one of the ♀♀ was removed and placed in the nest of a queenless colony of her own species, *L. fuliginosus*. She was attacked continuously in a desultory fashion, but made no attempts to conciliate her assailants by caresses. Next day she was still being dragged about, so at 2.5 p.m. she was restored

to the *umbratus* nest. Here she was at once attacked by five ants, so was removed and placed in a separate chamber with three *umbratus* to allow her to get rid of the *fuliginosus* odour, but she was still attacked by one of the three. As she was again attacked the following day on being restored to the nest, no further attempt was made to induce the colony to take her back.

In time the abdomens of the two ♀♀ began to become distended, and on the 17th there was a batch of about twenty eggs. These eggs were added to from day to day, and the queens' bodies became enormously distended so that they appeared like semi-transparent whitish sacs, with narrow bands of black.

On August 9th the eggs began to hatch, and the larvae grew rapidly in size and numbers. At the moment of writing (November 13th, 1911) there is a large number of half-grown larvae, which should, all being well, pupate early next spring.

Several times during the past summer *L. niger* pupae have been given to this colony, to try and ascertain whether the *umbratus* ☿☿ had any friendly instincts remaining towards the species in a colony of which they, in all probability, began their existence. The pupae were always readily carried in, but seemed to be left too long before being opened, with the result that the ☿☿ were dead or crippled when they did emerge. However, several lived for some time, but seemed to be bullied by the *umbratus*. There are now two *niger* ☿☿ in the nest, apparently in a perfectly healthy condition, and unmolested by their hosts.

It would have been more satisfactory in some ways if this paper had been delayed until the larvae had pupated and hatched. But as we have now proved for the first time the hypothesis that *L. fuliginosus* ♀♀ can be accepted by colonies of *L. umbratus* and bring up their young with the aid of their hosts, it seemed of greater importance to put the facts on record at once.

Crawley has already demonstrated (1909) that queens of *L. umbratus* (the other British parasitic species of this genus) do not lay eggs until the year following impregnation. We have now shown that is also the case with *L. fuliginosus*, as the ♀♀ fertilised in July 1910 did not lay till June and July 1911.

The queens of both these species are smaller in com-

parison with their ☿☿ than the queens of the rest of the genus, and have large heads and small bodies. It is clear that ♀♀ with delayed fertility and such a small store of body fat could not possibly exist without assistance during the two years that must elapse between their impregnation and the appearance of the first ☿☿ from their eggs. In short, this proves that queens of this species are unable to found colonies by themselves.

Appended is a list of all the literature on the subject known to us.

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XXX. *Descriptions of South American* Micro-Lepidoptera.

By E. Meyrick, B.A., F.R.S.

[Read November 15th, 1911.]

The following descriptions are taken from examples in my own collection, received from various sources. Nine genera and ninety-seven species are described as new.

CARPOSINIDAE.

Carposina maxima, n. sp.

♂. 35 mm. Head pale brownish-ochreous, face suffused with whitish with a brownish spot on each side, sides of crown whitish-suffused. Palpi $2\frac{3}{4}$, brown, towards apex suffused with whitish. Antennae dentate, ciliations 2. Thorax whitish-ochreous suffused with pale brownish. Abdomen dark grey. Forewings elongate, somewhat dilated, costa gently arched, apex obtuse, termen straight, rather oblique; light brownish-ochreous, with scattered minute raised white scales, especially on darker markings; some large tufts in disc towards base; some brownish suffusion along veins in disc and towards termen except on a pale ochreous elongate patch extending above middle from a scale-tuft on end of cell to termen beneath apex; a very undefined flattened-triangular patch of dark fuscous suffusion extending along costa from base to near apex, and reaching in middle nearly half across wing: cilia pale ochreous barred with brownish. Hindwings grey; cilia light brownish.

Colombia, San Antonio, 5,800 feet, in November; one specimen. A remarkable new form.

PHALONIADAE.

Phalonia vorticata, n. sp.

♀. 16 mm. Head and thorax ochreous-whitish. Palpi $2\frac{1}{2}$, whitish, with a few fuscous specks. Abdomen whitish-ochreous. Forewings elongate, posteriorly slightly dilated, costa gently arched, apex obtuse, termen nearly straight, oblique; 7 to costa; whitish-ochreous, suffused with white towards dorsum anteriorly; costa indistinctly strigulated with grey; a rhomboidal ochreous blotch irrorated with black on middle of dorsum, reaching rather more than half across wing; a moderate irregular ochreous terminal fascia,

sprinkled with black except on margins: cilia ochreous-whitish, on costa spotted with grey. Hindwings grey-whitish, becoming grey towards apex; cilia white.

Argentina, Parana; one specimen.

Phtheochroa fusifera, n. sp.

♂. 13 mm. Head, palpi, and thorax ochreous-whitish sprinkled with greyish-ochreous, palpi 2. Forewings elongate, posteriorly dilated, costa moderately arched, apex obtuse, termen nearly straight, somewhat oblique; whitish-grey, with some scattered blackish-grey scales, forming dots along dorsum; subcostal scale-tufts before and beyond $\frac{1}{2}$; a rather narrow ferruginous fascia from disc above middle to middle of dorsum, terminated above by grey suffusion, and on dorsum anteriorly mixed with dark fuscous; a pale ochreous patch extending from this along dorsum to tornus, where it reaches more than half across wing, enclosing a small dark fuscous spot on dorsum before tornus, and terminated posteriorly by a pointed-ovate deep ferruginous blotch extending obliquely upwards from middle of termen; extreme apex deep ferruginous: cilia grey-whitish, basal half deep ferruginous on upper half of termen. Hindwings with 6 and 7 stalked; grey, towards base whitish-tinged and spotted with darker; cilia whitish, with a pale grey shade.

Brazil, São Paulo; one specimen.

TORTRICIDAE.

Capua aluminias, n. sp.

♂. 27–28 mm. Head and thorax ochreous-whitish partially suffused with pale yellow. Palpi pale yellowish, with a lateral streak of ferruginous suffusion, terminal joint long. Antennae with short pectinations terminated by fascicles of long cilia. Abdomen ochreous-whitish. Forewings moderate, posteriorly dilated, costa gently arched, without fold, apex round-pointed, termen little oblique, concave on upper half, somewhat rounded-prominent on vein 4; ochreous-whitish, suffusedly strigulated with brassy-yellowish and somewhat sprinkled with brownish; costal and dorsal margins suffused with bronzy-fuscous and dotted with white; dark bronzy-fuscous dots in disc at $\frac{1}{3}$ and $\frac{3}{4}$; a narrow bronzy-fuscous fascia from $\frac{1}{3}$ of costa to dorsum before middle, right-angled in middle; a narrow bronzy-fuscous fascia running from apex to dorsum before tornus, sending a less-defined branch from above its

middle to $\frac{2}{3}$ of costa; terminal area beyond this tinged with bronzy and strigulated with white: cilia brassy-yellowish, on tornus bronzy-brownish. Hindwings ochreous-whitish, towards base with a patch of pale ochreous-yellowish suffusion; cilia whitish-yellow.

COLOMBIA, San Antonio, 5,800 feet, in November and December; four specimens.

Capua xylophaea, n. sp.

♂. 15 mm. Head and thorax brownish partially sprinkled with dark fuscous. Abdomen light greyish-ochreous. Forewings elongate, costa anteriorly moderately, posteriorly hardly arched, with moderate fold reaching from base to beyond $\frac{1}{4}$, apex obtuse, termen nearly straight, rather oblique; reddish-fuscous, with a few grey scales; tufts of scales on submedian fold at $\frac{1}{4}$ and middle of wing; upper half of central fascia moderate, oblique, blackish-grey; a small blackish spot in disc before $\frac{2}{3}$; an elongate semioval costal patch outlined with grey-whitish suffusion and spotted with blackish-grey; a blackish transverse strigula in disc at $\frac{5}{6}$ and another towards apex, placed in obscure whitish striae, terminal area beyond posterior stria darker reddish-fuscous: cilia light brownish. Hindwings light red-brownish, suffused with fuscous towards tornus; cilia fuscous-whitish with two fuscous shades.

ARGENTINA, Tucuman; one specimen.

Capua chrysostoma, n. sp.

♂. 22–25 mm. Head and thorax dark ferruginous-fuscous, minutely sprinkled with violet-whitish. Palpi ferruginous-orange. Antennal ciliations $1\frac{1}{2}$. Abdomen grey. Forewings suboblong, rather dilated posteriorly, costa anteriorly moderately arched, posteriorly straight, without fold, apex obtuse, termen somewhat bowed, rather oblique; dark brown, minutely sprinkled with violet-whitish; an undefined dark fuscous or blackish basal patch and central fascia, confluent on costa, fascia running from $\frac{1}{3}$ of costa to dorsum before tornus, rather dilated downwards; four very indistinct dark fuscous costal spots between fascia and apex, extreme costal edge between these ferruginous: cilia rather dark ashy-grey, basal half chestnut-brown. Hindwings and cilia grey.

COLOMBIA, San Antonio, 5,800 feet, in November and December; nine specimens.

Atteria chrysanthema, n. sp.

♀. 23–25 mm. Head black, face and a streak on each side of crown ochreous-white. Palpi black, with white streaks above and below. Thorax reddish-orange, three anterior spots and a posterior mark black. Abdomen reddish-orange, apex black. Forewings moderate, costa strongly arched, apex rounded-obtuse, termen slightly rounded, rather oblique; deep reddish-orange; an ochreous-white band round costa and termen, narrow on basal half, dilating posteriorly and on termen occupying $\frac{1}{3}$ of wing, marked with thick purple-black bars projecting slightly beyond its edge as follows, viz. a small one at base and two others near it, one larger at $\frac{1}{4}$, then a small one preceding a larger antemedian one, a large subtriangular one beyond middle enclosing a white costal mark, a long one from costa towards apex, broadly dilated on costa and reaching obliquely $\frac{2}{3}$ across wing, a subtriangular apical spot only reaching half across band, and an elongate blotch along lower part of termen and tornus, enclosing a white terminal dot above tornus: cilia black on bars, white on interspaces. Hindwings with 5 from below middle of transverse vein, 6 and 7 nearly approximated towards base; deep reddish-orange; a large purple-black apical spot, three rounded spots on lower part of termen, a dot above uppermost of these sometimes confluent with it, and a terminal dot near tornus; cilia orange, on spots black, beneath apical spot white.

Colombia, San Augustin, 3,500 feet, in September; Peru, Yquitos; two specimens.

Atteria flabellata, n. sp.

♀. 32 mm. Head reddish-orange, face whitish-orange. Palpi dark fuscous, internally ochreous-white, terminal joint ochreous-tinged. Thorax reddish-orange, with a purple-black spot on each patagium. Abdomen reddish-orange, extreme apex blackish. Forewings rather broad, costa strongly arched, apex rounded, termen rounded, somewhat oblique; deep reddish-orange; an ochreous-white band round costa and termen, narrow at base and gradually dilated, on termen occupying $\frac{1}{3}$ of wing, marked with thick purple-black bars projecting somewhat beyond its edge, as follows, viz. five on anterior half, two beyond middle confluent on lower half, one from apical portion of costa and apex much enlarged and enclosing two white dots on margin, a semicircular blotch on median portion of termen only reaching half across band and enclosing two white dots on termen, and a semicircular blotch on tornus; a small purple-black spot at base of wing, two dots obliquely placed in disc

towards base, and one in disc before middle: cilia ochreous-white, black on bars. Hindwings with 5 from middle of transverse vein, 6 and 7 nearly approximated towards base; deep reddish-orange; a purple-black apical blotch and four terminal spots below it, first connected with apical blotch, second smallest; cilia orange, on spots black, with whitish bars above and below apical blotch and below first terminal spot.

Ecuador; one specimen.

Meritastis voluta, n. sp.

♂. 23 mm. Head and thorax light grey. Palpi whitish-grey, terminal joint reddish-tinged. Antennal ciliations 1. Abdomen whitish-grey. Forewings moderate, posteriorly rather broadly dilated, costa moderately arched, apex obtuse, termen faintly sinuate, hardly oblique; light grey; costal edge reddish, costa beneath this dotted with dark fuscous; markings red-brown, edged and partly strigulated with dark reddish-fuscous; a rounded blotch on dorsum towards base, reaching half across wing; a very large subquadrate blotch extending on dorsum from middle to tornus and reaching $\frac{3}{4}$ across wing, its upper edge angularly excavated in middle; some suffusion towards dorsum between these blotches, and two irregular elongate marks between them and costa; a slender curved fascia from costa before $\frac{3}{4}$ to termen above tornus, separated from preceding blotch by two whitish strigae with faint reddish interspace: cilia whitish, with light grey basal shade. Hindwings grey-whitish, towards apex tinged with fuscous-reddish; cilia whitish, round apex with greyish subbasal shade.

Colombia, San Antonio, 5,000 feet, in November; one specimen.

Paraptila, n. g.

Palpi moderate, porrected, second joint with rough projecting scales above and beneath, terminal joint short. Thorax with lateral erect crest on each patagium and double posterior crest. Forewings with 3 from angle, 7 separate, to termen. Hindwings without basal pecten, 3 and 4 connate, 5 somewhat approximated, 6 and 7 stalked.

Allied to *Eulia* and *Cnephasia*.

Paraptila argocosma, n. sp.

♀. 24–25 mm. Head, palpi, and thorax dark ferruginous-fuscous. Abdomen grey. Forewings elongate, costa gently arched, apex

obtuse, termen slightly sinuate, little oblique; purplish-slaty-grey, obscurely striated transversely with whitish-brown; a small basal patch outlined by a whitish stria strongly curved in middle, lower half blackish surmounted posteriorly by a ferruginous spot; a roundish dark fuscous white-edged spot in disc at $\frac{1}{3}$, and two or three dots round it; upper half of central fascia moderately broad, rather oblique, ferruginous-blackish, rising from costa before middle, its extremity obliquely truncate, followed on costa by a silvery white triangular blotch, whose apex is sometimes connected with a pale yellow dot just beyond it; beyond this dot are two or three pale yellowish dots or marks, connected with it by a streak of blackish suffusion; between these and white costal blotch is a triangular patch of ferruginous suffusion, its apex touching a ferruginous-ochreous triangular patch occupying upper half of termen, enclosing an oblique wedge-shaped silvery-white mark whose apex rests on middle of termen: cilia ferruginous-brownish mixed with purplish-grey. Hindwings grey, apex tinged with ferruginous-brownish; cilia pale grey, with darker subbasal line, above apex with a darker purple-grey spot.

Colombia, San Antonio, 5,800 feet, in November; two specimens.

Cacoecia geographica, n. sp.

♂. 25 mm. Head and palpi deep ferruginous. Antennal ciliations 1, fasciculated. Thorax light ochreous-brownish mixed with whitish, collar suffused with dark fuscous, patagia whitish. Abdomen rather elongate, dark grey. Forewings elongate, posteriorly dilated, costa hardly arched, without fold, apex obtuse, termen almost straight, little oblique; light ochreous-brownish, strigulated with reddish-fuscous, with violet reflections; edge of basal patch only indicated, somewhat bent above middle; a large triangular dark ferruginous-fuscous patch extending on costa from before middle to $\frac{3}{4}$ and reaching $\frac{4}{5}$ across wing, edged posteriorly in middle by a spot of white suffusion; an irregular trapezoidal dark ferruginous-fuscous patch extending over most of termen, lower anterior angle in disc at $\frac{2}{3}$, upper near costa at $\frac{4}{5}$, these and side between them edged with white. Hindwings dark fuscous.

Venezuela, Palma Sola; one specimen.

Eulia craterosema, n. sp.

♂. 18 mm. Head and thorax whitish-fuscous, thoracic crest posteriorly dark fuscous. Palpi whitish-fuscous sprinkled with

dark fuscous. Abdomen grey. Forewings elongate, posteriorly dilated, costa moderately arched, apex obtuse, termen slightly rounded, somewhat oblique; dark fuscous; a broad ochreous-whitish streak, tinged with brownish on costa, extending from base of dorsum along costa to middle, attenuated to a point posteriorly; costal edge beyond this ochreous-whitish to apex; an ochreous-whitish triangular patch, tinged with brownish and slightly strigulated with dark fuscous except at apex, extending along dorsum from before $\frac{1}{3}$ to beyond tornus and reaching somewhat more than half across wing, its apex rounded and two upper sides subconcave; apical area lighter, suffused with whitish, with several blackish strigulae: cilia fuscous mixed with whitish, towards tornus ochreous-whitish. Hindwings grey suffused with whitish towards costa, obscurely spotted with darker grey; cilia whitish, towards tornus with a slight greyish antemedian shade.

Brazil, São Paulo; one specimen.

Eulia zelotypa, n. sp.

♂. 21–31 mm. Head and thorax deep brown more or less mixed or suffused with dark fuscous, thoracic crest posteriorly ochreous-whitish. Palpi ochreous-brown or pale ochreous. Antennae strongly flat-dentate, shortly ciliated. Abdomen grey. Forewings moderate, rather dilated posteriorly, costa rather strongly arched, apex obtuse, termen hardly sinuate, slightly oblique; pale ochreous-brown, with scattered blackish dots, especially a dorsal series, and two oblique transverse series posteriorly; a small dark fuscous basal patch, narrowed downwards and hardly reaching dorsum; a broad suffused ferruginous-brown or dark brown submedian longitudinal streak rising from this, beyond middle dilated upwards and forming a dark fuscous spot in disc, thence broadly suffused and extending over almost whole of termen; costa marked with two brown dots beyond basal patch, a triangular brown spot in middle, and a flattened-triangular brown blotch about $\frac{3}{4}$: cilia ochreous-brown, paler on tornus. Hindwings light grey, indistinctly strigulated with darker; a whitish-ochreous hairpencil lying beneath costa from before $\frac{1}{3}$ to beyond $\frac{2}{3}$, posteriorly lying on a black elongate mark; cilia ochreous-whitish.

♀. 31–40 mm. Forewings rather more elongate, wholly suffused with deep chestnut-brown, finely irrorated with purple-whitish, markings of ♂ indistinctly indicated, basal patch more whitish-irrorated, edge marked by a white line; hindwings somewhat darker grey, without hairpencil and black mark.

Colombia, San Antonio, 5,800 feet, in November and December; fifteen specimens (13 ♂, 2 ♀). Very similar to *xerophanes*, Meyr. (also referable to *Eulia*), but forewings broader, with costa more arched and termen less oblique, and *xerophanes* is without the hairpencil and black mark of hindwings.

Eulia sagmatica, n. sp.

♂. 23 mm. Head white. Palpi light grey. Antennae fasciculate-ciliated (2). Thorax white, patagia grey except margin, crest grey. Abdomen grey. Forewings moderately elongate, posteriorly dilated, costa gently arched, apex rounded-obtuse, termen slightly rounded, rather oblique; pale ochreous-grey, sprinkled with dark grey, irregularly strigulated and striated with white suffusion; markings fuscous mixed with dark fuscous; a small basal patch on costa, reaching half across wing; a large triangular patch extending on costa from $\frac{1}{4}$ to $\frac{3}{4}$, and reaching half across wing. Hindwings light grey obscurely strigulated with darker, margins obscurely strigulated with whitish suffusion; cilia white, with pale grey basal shade.

Colombia, San Antonio, 5,800 feet, in November; one specimen.

Eulia tholeraula, n. sp.

♂. 16 mm. Head whitish-ochreous. Palpi fuscous, terminal joint rather long. Antennal ciliations 2. Thorax whitish-ochreous mixed with fuscous. Abdomen grey. Forewings moderately elongate, somewhat dilated posteriorly, costa gently arched, apex obtuse, termen slightly rounded, rather oblique; ochreous-grey, partially tinged with brownish; basal patch fuscous on costal half, edge very oblique, separated from costal patch by two irregular white strigae; a flattened-triangular fuscous patch extending on costa from before $\frac{1}{3}$ to $\frac{4}{5}$ and reaching half across wing, its apical portion suffused with brown and dark fuscous; a rather narrow fuscous terminal fascia strigulated with dark fuscous, space between this and costal patch striated with white; a dorsal series of small dark fuscous spots separated by whitish on dorsal edge. Hindwings whitish-grey strigulated with rather dark grey; cilia whitish with grey subbasal shade.

Argentina, Parana; one specimen.

Eulia isodelta, n. sp.

♂ ♀. 18-19 mm. Head and thorax whitish. Palpi whitish, somewhat mixed with dark fuscous, terminal joint long. Antennal ciliations of ♂ 1½. Abdomen whitish-grey. Forewings moderately elongate, posteriorly dilated, costa slightly arched, apex obtuse, termen straight, somewhat oblique; whitish, with scattered dark fuscous scales, anterior half somewhat mixed with pale brown-reddish and olive-greenish; costa and dorsum dotted with blackish, costa with several small dark fuscous spots; a purplish-grey triangular patch spotted with blackish extending over median third of costa and reaching more than half across wing; a faint curved subterminal streak of grey or greenish-tinged irroration; some dark fuscous strigulae before termen: cilia whitish mixed and barred with grey, with a reddish-brown subbasal line. Hindwings in ♂ grey-whitish strigulated with grey, in ♀ greyer-tinged; cilia whitish, with light grey subbasal shade.

COLOMBIA, San Antonio, 5,800 feet, in November; two specimens.

Eulia conchitis, n. sp.

♀. 19 mm. Head and thorax white. Palpi dark grey, terminal joint long, its base white. Abdomen grey. Forewings elongate, posteriorly dilated, costa slightly arched, apex obtuse, termen slightly sinuate, rather oblique; white; a small grey basal patch on costa, reaching ⅔ across wing, sprinkled with blackish; a purplish-grey fascia mixed with yellow-greenish and black, extending on costa from before ⅓ to beyond ¾, on dorsum from middle to ¾, anterior edge rather concave, posterior nearly straight, enclosing a white post-median spot on costa followed by a dot, and a small white spot in middle of disc: a faint pale yellow-greenish narrow terminal fascia, on costa somewhat dilated and forming two small blackish-grey spots: cilia pale brownish, basal half red-brownish, terminal half mixed with dark grey. Hindwings whitish-grey, suffused with grey in disc beyond middle and towards apex; cilia ochreous-whitish.

COLOMBIA, San Antonio, 5,800 feet, in November; one specimen.

Ctenopseustis lurida, n. sp.

♂. 27–28 mm. Head and thorax pale yellow-brownish. Palpi brownish mixed with dark fuscous. Antennae with long fascicles of cilia rising from short projections. Abdomen grey mixed with

blackish, towards apex reddish-fuscous. Forewings suboblong, slightly dilated posteriorly, costa moderately arched, with strong fold extending from near base to $\frac{3}{4}$, apex obtuse, termen hardly sinuate, slightly oblique; reddish-ochreous-brown, more or less strewn with obscure dark grey dots, towards base paler and more or less suffused with yellowish; an oblique darker central fascia and costal patch faintly indicated but quite undefined; tornus somewhat suffused with yellow-whitish, tornal area distinctly dotted with leaden-grey: cilia dark brown. Hindwings with 6 and 7 connate; reddish-fuscous, obscurely strigulated and basal half suffused with blackish-grey; cilia whitish-fuscous, with reddish-fuscous subbasal shade.

COLOMBIA, San Antonio, 5,800 feet, in November; five specimens.

Cnephasia aenigmatica, n. sp.

♂. 19 mm. Head and thorax yellow-whitish sprinkled with grey. Palpi yellow-whitish, with dark fuscous transverse bands before and beyond middle. Antennae simple. Abdomen grey. Forewings elongate, posteriorly dilated, costa gently arched, apex obtuse, termen almost straight, somewhat oblique; whitish, with a few scattered dark fuscous scales; basal area with some scattered blackish marks and pale yellowish streaks; costa with about ten pairs of oblique blackish strigulae, whence arise pale yellow grey-edged marks or streaks, one from $\frac{1}{3}$ of costa long, running to $\frac{2}{3}$ of disc where it terminates in a group of blackish marks, next three successively shorter, converging to same point, those beyond short, irregular; dorsum suffused with pale yellowish and marked with several irregular blackish spots; a curved subterminal blackish fascia from near costa to tornus, cut by a series of yellow longitudinal marks. Hindwings grey; cilia whitish-grey, with grey subbasal shade.

COLOMBIA, San Antonio, 5,800 feet, in November; one specimen.

Cnephasia hyacinthina, n. sp.

♂. 18 mm. Head and thorax pale brownish, thorax mixed with pale yellowish. Palpi violet-grey-whitish, second joint yellowish-tinged and barred with grey. Antennae simple. Abdomen grey. Forewings elongate, posteriorly dilated, costa gently arched, apex obtuse, termen straight, little oblique; rather deep bronzy-brown, irregularly spotted towards margins with yellow suffusion; eleven silvery-white blackish-edged costal marks, fifth, sixth, and seventh produced into oblique strigae; basal third and dorsal area irregularly

spotted with silvery-white; a rather large silvery-white blackish-edged spot in disc at $\frac{2}{3}$, suffused with pale yellow posteriorly; some undefined blackish suffusion beyond this; three irregular silvery-white blackish-edged marks above tornus, and three longitudinal marks resting on upper part of termen: cilia brassy-yellowish with bronzy-brown basal line, towards tornus largely suffused with bronzy-brown. Hindwings dark grey; cilia pale grey, with dark grey subbasal line.

COLOMBIA, San Antonio, 5,800 feet, in November; one specimen.

Cnephasia citroleuca, n. sp.

♂. 23 mm. Head and thorax fuscous mixed with white and dark fuscous. Palpi dark fuscous, apex suffused with whitish. Antennae simple. Abdomen grey. Forewings elongate, posteriorly dilated, costa gently arched, apex obtuse, termen almost straight, little oblique; dark fuscous suffusedly mixed with ferruginous-brown; costa marked with white strigulae, anteriorly paired; markings silvery-white partially spotted with lemon-yellow suffusion; two pairs of irregular subconfluent transverse striae, partly broken into dots, first running from $\frac{1}{5}$ of costa to middle of dorsum, connected with base of dorsum by a furcate streak from middle, its second stria not quite reaching dorsum but continuous with first of second pair, second pair running from $\frac{4}{5}$ of costa to $\frac{3}{4}$ of dorsum, broadly interrupted in middle, with a furcate projection inwards above this, dorsal edge between these dotted with white; a group of several dots on tornus: cilia rather dark fuscous, barred with white on costa and tornus. Hindwings grey; cilia light grey, towards tips whitish.

COLOMBIA, San Antonio, 5,800 feet, in November; one specimen.

Cnephasia hydrogramma, n. sp.

♂. 24 mm. Head and thorax ochreous-brownish mixed with whitish, patagia with expansible apical scales. Palpi fuscous sprinkled with yellow-whitish, basal joint pale yellowish. Antennae simple. Abdomen dark fuscous. Forewings elongate, posteriorly dilated, costa almost straight, apex obtuse, termen rounded, rather oblique; ferruginous, with light silvery-grey reticulations, formed by irregular interrupted streaks on veins and a series of transverse double lines crossing them, with scattered yellow-green or greenish-yellow scales in interspaces, and a series of small spots before termen; costal half from near base to $\frac{2}{3}$, and costal $\frac{3}{4}$ beyond this largely suffused with blackish between the reticulations except along termen, and some

slight blackish suffusion on dorsum; a small elongate ferruginous spot in disc about middle at $\frac{3}{4}$ is surrounded with bluish-silvery except anteriorly. Hindwings dark fuscous.

Dutch Guiana, Paramaribo, in August; one specimen.

Cnephasia iantha, n. sp.

♀. 28 mm. Head and palpi brown, face mixed with dark ferruginous-fuscous. Thorax dark ferruginous-fuscous, sprinkled with purple-whitish, apex of patagia and posterior extremity grey-whitish. Abdomen grey. Forewings suboblong, costa gently arched, apex obtuse, termen hardly sinuate, little oblique; ochreous-brownish, sprinkled with fuscous and partially suffused with ferruginous, strewn with undefined dots of purple-whitish irroration; an irregular oblique central fascia and triangular costal patch deep ferruginous suffused with blackish on costal half of wing, ill-defined and partially confluent: cilia ferruginous-brown. Hindwings grey; cilia whitish-grey, with grey basal shade.

Colombia, San Antonio, 5,800 feet, in November; one specimen.

Cnephasia ranunculata, n. sp.

♂. 21–26 mm. Head, palpi, and thorax whitish-fuscous. Antennae with short pectinations terminating in fascicles of long cilia. Abdomen ochreous-whitish sprinkled with grey. Anterior femora with expansible hairtuft above from base. Forewings moderate, posteriorly rather dilated, costa anteriorly moderately, posteriorly slightly arched, apex rather pointed, termen somewhat oblique, sinuate beneath apex, rather prominent in middle; whitish-fuscous, more or less suffused with ochreous-whitish in disc and towards termen, with scattered fuscous and ochreous-brownish scales; some small scattered dark fuscous marks and strigulae; markings dark fuscous sometimes tinged or mixed with deep green, edged with whitish; an elongate spot in disc towards base, attenuated anteriorly and enlarged posteriorly, and a small subtriangular spot between this and costa; a thick bar running from costa beyond $\frac{1}{3}$ obliquely more than half across wing, its posterior side in disc forming a strong triangular projection obliquely upwards; four small semicircular spots on posterior half of costa: cilia grey, towards tornus suffused with ochreous-whitish. Hindwings ochreous-whitish, tinged with grey towards tornus, with several grey dots on median fold posteriorly; cilia whitish.

Colombia, San Antonio, 5,800 feet, in November and December; fifteen specimens.

Cnephasia clisias, n. sp.

♂. 14-15 mm. Head, palpi, thorax, and abdomen whitish-ochreous, palpi sprinkled with brownish. Antennal ciliations $\frac{1}{2}$. Forewings elongate, rather dilated posteriorly, costa slightly arched, apex obtuse, termen slightly rounded, rather oblique ; pale ochreous or whitish-ochreous; an outwardly oblique dark brown streak from dorsum towards base, reaching more than half across wing, suffused anteriorly ; central fascia moderately broad, oblique, light brownish, anterior edge nearly straight, suffused with dark brown except towards costa, posterior edge irregular ; a faint light brownish fascia from $\frac{3}{4}$ of costa to middle of termen; some dark fuscous scales tending to form minute dots on posterior part of costa, termen, and dorsum : cilia whitish-ochreous. Hindwings and cilia pale whitish-ochreous.

ARGENTINA, Parana ; two specimens.

Cnephasia tenontias, n. sp.

♂. 22 mm. Head, palpi, and thorax ferruginous, thorax with well-developed double posterior crest. Antennal ciliations $\frac{2}{3}$. Abdomen whitish-ochreous. Forewings elongate-triangular, costa gently arched, apex obtuse, termen almost straight, oblique ; ferruginous-ochreous, more ferruginous towards dorsum ; a dark ferruginous-brown inwardly oblique bar from dorsum before middle, reaching submedian fold ; a small triangular dark ferruginous-brown spot on dorsum towards tornus, margined with a few pale yellowish scales, its apex emitting a faint fine pale yellowish line to costa before middle, and another nearly parallel to termen, curved towards costa : cilia ferruginous-ochreous. Hindwings yellow-whitish, slightly greyish-tinged towards tornus ; cilia yellow-whitish.

CHILI ; one specimen.

CHRYSOXENA, n. g.

Antennae in ♂ bipectinated. Palpi moderate, subascending, with appressed scales, terminal joint very short. Thorax without crest. Forewings with 7 separate, to termen. Hindwings without pecten ; 3 and 4 connate, 5 approximated, 6 and 7 stalked.

Type *auriferana*, Busck, Proc. U.S. Mus. XL, 227 ; Brazil and Florida.

Sparganothis myrota, n. sp.

♂. 20–22 mm. Head, palpi, and thorax dark ferruginous-brown. Antennal ciliations long, fasciculated (2½). Abdomen fuscous. Forewings suboblong, costa anteriorly strongly, posteriorly slightly arched, without fold, apex obtuse, termen hardly sinuate, little oblique, 7 and 8 stalked for ¼ of length; ferruginous-brown, strewn with small blackish dots and strigulae tending to form transverse series; a broad band of purplish-brown suffusion along anterior half of costa, continued as an oblique central fascia to dorsum before tornus, and a large triangular similar apical patch, confluent with this on tornus: cilia orange, on tornus purplish-brown. Hindwings and cilia whitish; 3 and 4 connate.

Colombia, San Antonio, 5,800 feet, in November; two specimens.

Peronea viridescens, n. sp.

♀. 27 mm. Head and palpi brownish-ochreous, palpi 4, partially speckled with dark fuscous. Thorax brownish spotted with dark fuscous. Abdomen fulvous-brownish. Forewings suboblong, costa strongly arched, slightly roughened with scales, apex obtuse, termen slightly rounded, oblique; lilac-brownish, strewn with dark greenish-fuscous dots and strigulae, coalescing to form three irregular blotches on costal half anteriorly, and some small costal spots posteriorly: cilia brownish-ochreous. Hindwings with 5 parallel; fulvous tinged with fuscous; cilia fulvous-ochreous.

Brazil, Novo Friburgo; one specimen.

Peronea purpurascens, n. sp.

♂ ♀. 24–28 mm. Head and thorax whitish irrorated with dark purple-fuscous. Palpi 4, white, externally suffused with dark purplish-fuscous. Abdomen whitish-grey, in ♂ with expansible ochreous-whitish hairpencil from each side of anal segment. Forewings oblong, costa moderately arched, more strongly anteriorly, roughened with scales, apex obtuse, termen straight, rather oblique; blue-whitish, suffusedly mixed with purplish-grey, with some scattered black scales; a small pale shining blue mark in middle of base; two dark purple-fuscous striae crossing wing at ¼, in ♂ coalesced into a blackish streak, second terminated in a tuft on fold; a very undefined large blotch of purple suffusion with some blue and black scales occupying median third of costa and reaching ⅔ across wing; small dark purple-fuscous spots on dorsum before middle and

at $\frac{2}{3}$, and others above fold just beyond these ; two or three deep ferruginous strigae before termen : cilia purplish-grey irrorated with whitish. Hindwings with 5 parallel ; whitish-grey, more whitish towards base, especially in ♂, greyer at apex; cilia whitish, with grey subbasal line.

PERU, Aqualani, 9,000 feet, in December, 1 ♀, type; COLOMBIA, San Antonio, 5,800 feet, in November, 1 ♂. At first sight much like *bryographa*, Meyr., but forewings obviously shorter and broader, without green colouring (present in all examples of *bryographa*), tufts less numerous and differently arranged, with other differences of detail.

Peronea trochilodes, n. sp.

♀. 34–36 mm. Head, palpi, and thorax dark purplish-fuscous, palpi 4. Abdomen light fuscous. Forewings suboblong, costa anteriorly strongly, posteriorly gently arched, with rough loosely projecting scales, towards base bent over beneath and fringed with long scales, apex obtuse, termen slightly rounded, rather oblique ; brownish, largely suffused with purplish-fuscous; basal patch ochreous-brownish or dark purplish-fuscous, broadest on costa, edge rather curved, limited by a dark purple-fuscous streak terminated by a large tuft on fold, base of dorsum marked with a small spot of metallic-green suffusion ; a more or less developed patch of metallic-green suffusion beyond basal patch above middle; two or three blackish dots in disc beyond middle, and sometimes a few green scales round them; a small tuft below middle of disc, and another on fold obliquely beyond it : cilia fuscous irrorated with paler, basal half spotted with brownish. Hindwings with 5 parallel ; light fuscous, darker posteriorly; cilia light fuscous, with faint darker subbasal line.

COLOMBIA, San Antonio, 5,800 feet, in November ; two specimens.

Peronea marmarodes, n. sp.

♀. 30–33 mm. Head grey-whitish. Palpi 4, grey sprinkled with whitish, externally with a streak of dark reddish and blackish suffusion. Thorax grey mixed with whitish, and on patagia with dark fuscous. Abdomen grey. Forewings elongate, costa anteriorly strongly, posteriorly gently arched, on basal $\frac{2}{5}$ bent over beneath and fringed with long scales, on posterior $\frac{3}{5}$ with projections of rough scales, apex obtuse-pointed, termen hardly sinuate, oblique ; ochreous-grey, mixed with whitish and sometimes with ferruginous-reddish ; markings purplish-grey mixed with dark red-brown and

sometimes with blackish ; basal patch narrow on costa and broadly dilated towards dorsum, marked with two or three spots of metallic-green, and enclosing a large tuft on fold within its posterior edge ; from this a more or less broad streak extends along dorsum to a tornal patch reaching on termen to near apex ; a triangular patch on costa from before middle to $\frac{4}{5}$, connected with dorsal streak before middle by a very undefined fascia spotted with metallic-green : cilia grey irrorated with whitish, base spotted with blackish suffusion. Hindwings with 5 parallel ; grey, slightly darker posteriorly ; cilia pale grey, with darker subbasal line.

Colombia, San Antonio, 5,800 feet, in November; two specimens.

Peronea limosa, n. sp.

♀. 18 mm. Head, palpi, and thorax fuscous mixed with darker and sprinkled with whitish-ochreous, palpi 3. Abdomen grey. Forewings elongate, posteriorly dilated, costa moderately arched, apex obtuse-pointed, termen slightly sinuate, rather oblique ; whity-brownish, irregularly strigulated with grey and dark fuscous ; a large patch of grey suffusion marked with blackish strigulae extending from $\frac{1}{4}$ to beyond middle, occupying whole breadth of wing except dorsum and posteriorly extended as an oblique fascia to tornus, including a large brownish tuft on fold anteriorly, and several tufts in disc ; an irregular brownish streak from $\frac{3}{4}$ of costa to termen above tornus : cilia grey irrorated with whitish, obscurely barred with dark grey irroration. Hindwings with 5 nearly parallel ; grey, darker posteriorly ; cilia pale grey, with darker subbasal line.

Colombia, at 4,400 feet, in February ; one specimen.

EUCOSMIDAE.

Eucosma leucodesma, n. sp.

♀. 14 mm. Head, palpi, and thorax ochreous-white. Abdomen pale grey. Forewings elongate, costa gently arched, apex obtuse, termen somewhat sinuate, little oblique ; ochreous-white; costa strigulated with dark fuscous ; basal patch strigulated with light grey, outer edge curved, its lower half marked with three small black spots ; apical half of wing grey, strigulated with white on costa and termen, with several oblique ochreous-brown strigae from costa, first connected with a series of three brownish spots with some black scales preceding ocellus, third striga extended to middle of

termen, fifth reaching termen beneath apex ; a small ochreous-brown apical spot ; ocellus limited with pale leaden-metallic anteriorly and white posteriorly, edge of latter streak marked with a black speck : cilia white, basal half finely sprinkled with dark grey on termen. Hindwings with 3 and 4 coincident; whitish-grey, greyer posteriorly; cilia whitish, with light grey subbasal shade.

ARGENTINA, Parana; one specimen.

Bactra clarescens, n. sp.

♂ ♀. 15–17 mm. Head and thorax pale ochreous. Palpi in ♂ 2, in ♀ 2½, fuscous-whitish, more or less slightly infuscated. Antennal ciliations in ♂ ⅔. Abdomen ochreous-grey-whitish. Forewings elongate, rather narrow, hardly dilated, costa slightly arched, apex obtuse, termen straight, somewhat oblique ; pale ochreous, mixed with pinkish-ochreous and more or less sprinkled with fuscous ; costa and dorsum shortly strigulated with dark fuscous irroration; undefined spots of dark fuscous suffusion in disc at ⅓ and ⅔ ; several oblique brownish strigae from costa posteriorly ; veins between cell and termen marked with fuscous lines ; ocellus sometimes containing two or three short marks of blackish irroration, its margin obscurely indicated with leaden-metallic : cilia whitish-ochreous, with dark fuscous basal line and grey postmedian shade. Hindwings grey-whitish, towards apex suffused with light grey ; cilia whitish, round apical area with grey basal line.

DUTCH GUIANA, Paramaribo, in August and December ; five specimens.

Argyroploce sediliata, n. sp.

♂. 23 mm. Head ochreous-white. Palpi porrected, greenish-grey, terminal joint and apical edge of second ochreous-white. Antennal ciliations 1. Thorax ochreous-white, mixed with greenish anteriorly. Abdomen ochreous-grey-whitish. Forewings elongate, costa moderately arched, apex obtuse, termen slightly rounded, little oblique ; purplish-grey mixed with pale greyish-ochreous, costa obscurely strigulated with whitish ; a very irregular undefined broad median streak of greenish suffusion running from base to apex, sprinkled with black and on posterior half including an interrupted streak of black suffusion, a small apical spot of this cut off by a ring of silvery-whitish strigulation ; dorsal area beneath this wholly ochreous-whitish, somewhat suffused with greenish towards termen ; posterior edge of ocellus indicated by a silvery-metallic mark, preceded by three or four black specks : cilia greenish mixed with

whitish, at apex with blackish subbasal line. Hindwings with 3 and 4 stalked, 5 approximated at base; grey-whitish, greyer towards apex; cilia grey-whitish.

Colombia, San Antonio, 5,800 feet, in November; one specimen.

Argyroploce lupata, n. sp.

♂. 27 mm. Head and thorax brown mixed with darker. Palpi ascending, dark purplish-coppery-fuscous. Antennal ciliations minute. Abdomen dark grey. Forewings elongate, posteriorly dilated, costa moderately arched, apex obtuse, termen somewhat sinuate, vertical; light brownish, becoming darker towards costa, costal edge dark fuscous, posteriorly with pairs of minute whitish strigulae; a darker brown dorsal streak edged above by a reddish-black streak, its upper edge with a short acute projection before middle, and terminating before tornus in a dilation enclosing a round pale brown spot and sending a short acute projecting streak upwards; ocellus ochreous-whitish edged posteriorly with leaden-metallic and containing three black dots: cilia light brownish-ochreous, partially spotted with grey. Hindwings with 3 and 4 connate, 5 closely approximated at base; dark grey; cilia ochreous-whitish, with dark grey subbasal shade.

Colombia, San Antonio, 5,800 feet, in November and December; two specimens.

Argyroploce vermiculata, n. sp.

♂. 19 mm. Head and thorax pale brownish, partially mixed with dark fuscous. Palpi ascending, dark purple-fuscous mixed with ferruginous. Antennal ciliations minute. Abdomen light grey. Forewings elongate, somewhat dilated posteriorly, costa gently arched, apex obtuse, termen straight, vertical; ferruginous-brown, sprinkled with blackish, and closely vermiculated with rosy-grey-whitish except towards costa posteriorly and termen; costa strigulated with blackish and whitish; upper third of central fascia brown, with an acute projection on posterior edge, lower extremity indicated by an oblique blackish spot on dorsum before tornus; five violet-leaden-metallic strigae rising from pairs of whitish strigulae on posterior half of costa, first running out to termen beneath apex and receiving the other four; ocellus limited with leaden-metallic and containing three short black dashes edged with ochreous-whitish suffusion, posterior margin followed by an ochreous-white streak: cilia ferruginous-brownish with purplish-fuscous subbasal

line, beyond ocellus suffused with coppery-metallic. Hindwings with 3 and 4 connate, 5 closely approximated at base; grey, darker towards apex; cilia ochreous-whitish.

COLOMBIA, San Antonio, 5,800 feet, in November; one specimen.

Argyroploce caveata, n. sp.

♀. 22 mm. Head and thorax ochreous-brown mixed and barred with purplish-fuscous. Palpi ascending, purplish-fuscous, tinged with orange-ochreous towards apex. Forewings elongate, posteriorly dilated, costa gently arched, apex obtuse, termen faintly sinuate, vertical; ochreous-brown, with thick irregular shining violet-grey transverse striae, somewhat strigulated with dark fuscous between these; costal edge dark fuscous; a dark brown oblique transverse blotch on middle of costa, not reaching $\frac{1}{2}$ across wing; five short oblique blue-leaden strigae rising from pairs of pale costal strigulae between this and apex, their apices connected; a bluish-silvery-metallic transverse mark before middle of termen, edged with pale ochreous posteriorly, and preceded by two dark brown elongate dots: cilia light lilac-brownish sprinkled with darker. Hindwings with 3 and 4 connate, 5 very closely approximated at base; dark bronzy-fuscous; cilia fuscous, with darker subbasal shade.

VENEZUELA, Palma Sola; one specimen.

Argyroploce electrias, n. sp.

♂. 25 mm. Head and thorax dark fuscous. Palpi rather short, subascending, fuscous. Antennal ciliations 1. Abdomen dark grey. Forewings elongate, posteriorly dilated, costa moderately arched, apex obtuse, termen slightly rounded, almost vertical; dark fuscous; basal area irregularly sprinkled with violet-blue-metallic; central fascia rather broad, irregular-edged, blackish-fuscous, posteriorly edged by a violet-blue-metallic stria rising from a white costal dot; a second similar stria near beyond this, partially confluent with it on lower $\frac{2}{3}$; three posterior short blue-metallic strigae from white dots on costa; two irregular blue-metallic streaks enclosing ocellus and reaching upwards $\frac{2}{3}$ across wing: cilia fuscous, with darker basal shade. Hindwings with 3 and 4 connate, 5 very closely approximated at base; dark fuscous; cilia bluish-fuscous, with darker basal shade.

COLOMBIA, San Antonio, 5,800 feet, in November; one specimen.

Argyroploce logica, n. sp.

♂. 21 mm. Head, palpi, and thorax dark reddish-brown mixed with dark fuscous, palpi porrected. Antennal ciliations $\frac{1}{2}$. Abdomen dark grey. Forewings elongate-triangular, costa moderately arched, apex obtuse, termen slightly rounded, vertical; reddish-fuscous mixed with grey and sprinkled with pale greyish-ochreous, tending to form transverse striae; markings dark reddish-fuscous mixed with blackish; a transverse streak indicating edge of basal patch, angulated above middle and interrupted above angulation; central fascia moderately broad, not oblique, but with an irregular streak running from its posterior edge above middle nearly to a small mark on dorsum before tornus; beyond this are two rather thick straight oblique leaden-metallic striae running into a leaden-metallic spot which extends over lower half of termen, followed immediately by an oblique transverse streak composed of an upper triangular and lower trapezoidal spot connected at anterior angles, not quite reaching termen; three pairs of pale costal strigulae towards apex: cilia reddish-fuscous mixed with grey. Hindwings with 3 and 4 connate, 5 closely approximated at base; dark grey; cilia pale grey, with darker subbasal shade.

Colombia, San Antonio, 5,800 feet, in November; one specimen.

GELECHIADAE.

Oxycryptis, n. g.

Head with appressed scales; tongue developed. Antennae $\frac{3}{4}$, in ♂ simple, basal joint moderate, without pecten. Labial palpi long, curved, ascending, second joint relatively short, clothed with dense scales, rough beneath, terminal joint much longer than second, thickened with dense scales, somewhat roughly expanded posteriorly throughout and concealing apex. Maxillary palpi very short, filiform, appressed to tongue. Forewings with 2 from near angle, 3 and 4 closely approximated at base, 7 and 8 stalked, 7 to costa, 11 from middle. Hindwings over 1, trapezoidal, termen slightly sinuate beneath apex, cilia $\frac{4}{5}$; 3 and 4 closely approximated at base, 5 approximated, 6 and 7 connate.

Apparently allied to *Gelechia*, from which it is distinguished by the peculiar palpi.

Oxycryptis attonita, n. sp.

♂. 17 mm. Head, palpi, and thorax light ochreous-brownish, palpi sprinkled with dark fuscous. Abdomen pale grey, anal tuft

large, whitish-ochreous. Forewings elongate, very narrow, costa gently arched, apex round-pointed, termen extremely obliquely rounded; brownish-ochreous; a very obscure oblique brown fascia from $\frac{1}{3}$ of costa, not crossing fold; apical half of wing beyond an oblique line parallel to this suffused with brown; some rough erect scales along fold from near base to fascia: cilia ochreous-brownish, mixed with black round apex. Hindwings grey; a subcostal pencil of long ochreous-tinged hairs extending from $\frac{1}{3}$ to $\frac{2}{3}$; a slight pencil of long hairs lying along lower margin of cell from base; cilia ochreous-grey-whitish, greyer towards base.

COLOMBIA, San Antonio, 5,800 feet, in November; one specimen.

PARASTEGA, n. g.

Head with appressed scales; ocelli absent; tongue developed. Antennae $\frac{1}{3}$, basal joint elongate, without pecten. Labial palpi very long, recurved, second joint beneath with brush of rough projecting scales, terminal joint as long as second, posteriorly expanded with projecting scales except towards extremities, acute. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiae clothed with long hairs above. Forewings with 2 from towards angle, 3 and 4 stalked, 7 and 8 stalked, 7 to costa, 11 from middle. Hindwings over 1, trapezoidal, cilia $\frac{2}{3}$; 3 and 4 nearly approximated at base, 5 approximated, 6 and 7 nearly approximated towards base.

Allied to *Stegasta*, from which it differs by the projecting scales of terminal joint of palpi.

Parastega niveisignella, Zell.

(*Psoricoptera niveisignella*, Zell., Hor. Soc. Ent. Ross. xiii, 333, Pl. IV, 106.)

Described from Panama; I have it also from Dutch Guiana.

Gelechia paphlactis, n. sp.

♂. 15 mm. Head and thorax white, shoulders with a spot of black irroration. Palpi white, second joint irrorated with black except apex, terminal joint somewhat shorter than second, with two bands of black irroration. Abdomen ochreous-whitish sprinkled with grey. Forewings elongate, narrow, costa gently arched, apex obtuse, termen very obliquely rounded; white, dorsal area tinged with grey; markings grey suffusedly irrorated with blackish; a spot on costa at base, and three others between this and $\frac{3}{4}$; a small spot on dorsum at $\frac{1}{4}$, two obliquely placed in disc beyond this, and two

others similarly placed in middle, lower on fold and somewhat raised; two or three undefined dots in disc beyond this, and a spot on dorsum before tornus; a series of cloudy dots round posterior part of costa and termen, and some irregular marking in apical area: cilia white, with undefined bars of dark grey irroration. Hindwings 1, grey, paler and thinly scaled towards base; cilia grey-whitish.

Brazil, São Paulo; one specimen.

Anacampsis chrysoplaca, n. sp.

♀. 18 mm. Head shining dark purple-bronze, face and supra-orbital scales ochreous-whitish. Palpi whitish-ochreous, anterior edge of terminal joint infuscated. Thorax dark purple-fuscous sprinkled with whitish. Abdomen dark fuscous. Forewings elongate, narrow, costa anteriorly slightly, towards apex moderately arched, apex obtuse, termen slightly rounded, little oblique; dark fuscous irrorated with ochreous-whitish; a round orange apical patch with a projection along termen, edged with blackish except on a small whitish spot on costa, and enclosing an elongate golden-metallic spot: cilia pale metallic bronzy. Hindwings over 1, termen hardly sinuate; dark fuscous; cilia grey-whitish, basal third grey.

Venezuela, Ciudad Bolivar, in September; one specimen.

Lecithocera fausta, Meyr.

Labial palpi ochreous-whitish, second joint thickened with scales, somewhat rough beneath towards apex, externally fuscous except apex, terminal joint as long as second. Forewings with 9 separate (misstated to rise out of 7 by a clerical error).

Brazil, Entre Rios; Argentina, Parana; three specimens. This species was described from an example from the Philippines, but there is no doubt whatever of the specific identity of these specimens; as the genus is largely represented in the Indo-Malayan region, whilst this is the only American species known to me, I infer that the Malay Archipelago is its home, and that it has been probably artificially introduced into South America with its foodplant, but the larval habits are unknown.

Trichotaphe directa, n. sp.

♂ ♀. 14–16 mm. Head, thorax, and abdomen grey. Palpi with second joint dark fuscous, with dense expanded scales towards apex

above, terminal joint in ♂ as long as second, in ♀ very much longer, ochreous-whitish, anterior edge dark fuscous. Antennal ciliations in ♂ 1. Forewings elongate, rather narrow, costa slightly arched, faintly sinuate in middle, apex rounded-obtuse, termen rounded, somewhat oblique ; fuscous-grey ; extreme costal edge whitish anteriorly ; stigmata rather large, blackish, plical directly beneath first discal : cilia grey. Hindwings rather dark grey ; cilia pale grey, with darker subbasal shade. Undersurface of forewings in ♂ with subcostal fringe of regular long scales directed downwards from ¼ to middle.

VENEZUELA, Ciudad Bolivar, in May and June; two specimens.

Dichomeris amphicoma, n. sp.

♀. 21 mm. Head whitish-ochreous mixed with grey on crown. Palpi with second joint long, whitish-ochreous mixed with dark fuscous and whitish, clothed with long rough projecting scales above and with dense projecting apical tuft beneath, terminal joint as long as second, ochreous-whitish, anterior edge dark fuscous. Thorax whitish-ochreous with broad fuscous dorsal stripe. Forewings elongate, rather narrow, slightly dilated posteriorly, costa slightly arched towards extremities, apex round-pointed, termen straight, rather oblique ; light ochreous-brownish, strewn with dark fuscous strigulae ; a blackish streak suffused with darker brown running from base of dorsum to costa just above apex, costal area above this paler ochreous : cilia pale ochreous. Hindwings grey ; cilia ochreous-whitish, with grey subbasal line.

BRAZIL, Santos ; one specimen.

OECOPHORIDAE.

Borkhausenia crimnodes, n. sp.

♂. 13 mm. Head whitish-ochreous. Palpi ochreous-whitish, basal half of second joint, and basal and subapical rings of terminal joint dark fuscous. Antennal ciliations 4. Thorax whitish-ochreous, shoulders with a dark fuscous spot. Abdomen whitish-grey, anal tuft whitish-ochreous. Forewings elongate, narrow, costa gently arched, apex obtuse, termen very obliquely rounded ; whitish-ochreous, with scattered fuscous scales ; markings dark fuscous tinged with purplish ; a basal patch extending on costa to ⅓, and on dorsum to beyond middle, edge irregular and suffused ; stigmata large, darker, first discal resting on basal and second on apical patch, an additional

distinct spot between and slightly above these, plical absorbed in basal patch; a suffused patch on costa beyond middle; an apical patch extending on costa to $\frac{3}{4}$ and on termen to tornus: cilia whitish-ochreous, towards base barred with dark fuscous. Hindwings light grey; cilia whitish-ochreous.

ARGENTINA, Parana; one specimen.

Machimia encamina, n. sp.

♂. 14 mm. ♀. 19 mm. Head rosy-purplish. Palpi rose-pink irrorated with dark purplish-fuscous, basal half of second joint in ♀ dark fuscous. Antennal ciliations in ♂ 3. Thorax yellow-brownish. Abdomen light rosy-yellowish. Forewings elongate, posteriorly dilated, costa gently arched, apex obtuse, termen slightly sinuate, somewhat oblique; yellow suffused with fulvous-brownish, especially on veins and along costa and termen, in ♀ sprinkled with dark brown; costa tinged with crimson on posterior half, dark brown towards base; stigmata fulvous-brown, plical beneath first discal; a transverse fulvous mark on dorsum beneath second discal; a fulvous brownish line from before $\frac{3}{4}$ of costa to tornus, rather strongly curved opposite apex and less so towards lower extremity, nearly straight between these: cilia in ♂ on costa and tornus rosy, on termen grey-whitish with basal third dark purplish-fuscous, in ♀ more suffused and less contrasted. Hindwings in ♂ light crimson-rose, in ♀ ochreous-yellow, towards apex rosy; cilia concolorous, towards tips more whitish.

VENEZUELA, Ciudad Bolivar, in April and May; two specimens.

Machimia fundigera, n. sp.

♂. 14 mm. Head, thorax, and abdomen whitish-ochreous. Palpi whitish, second joint dark fuscous except towards apex. Antennal ciliations 2. Forewings elongate, posteriorly dilated, costa slightly arched, apex obtuse, termen slightly sinuate, little oblique; whitish-ochreous, sprinkled with brown scales tipped with dark fuscous; stigmata indicated by groups of these scales; a line composed of similar scales and partially broken into dots running from $\frac{4}{5}$ of costa to dorsum before tornus, indented beneath costa and above dorsum, curved outwards between these indentations: cilia pale rosy-pink, on termen with a basal line of dark brown scales, on tornus ochreous-whitish. Hindwings and cilia ochreous-whitish.

DUTCH GUIANA, Paramaribo, in March; one specimen.

Machimia morata, n. sp.

♂. 13–15 mm. Head and thorax whitish-ochreous tinged with brownish above. Palpi ochreous-whitish, second joint fuscous except apex. Antennal ciliations 2½. Abdomen fuscous-whitish. Forewings elongate, posteriorly slightly dilated, costa gently arched, apex obtuse, termen rounded, oblique; whitish-ochreous sprinkled with fuscous; stigmata blackish, plical small, rather beyond first discal; a more or less incomplete strongly curved series of dark fuscous dots rather near margin from beneath ⅔ of costa to above dorsum before tornus: cilia whitish-ochreous. Hindwings and cilia ochreous-grey-whitish.

ARGENTINA, Parana; three specimens.

Machimia orthodoxa, n. sp.

♂. 19 mm. Head and thorax whitish-ochreous. Palpi ochreous-whitish, lower half of second joint dark fuscous. Antennal ciliations 5. Abdomen pale whitish-ochreous. Forewings elongate, posteriorly slightly dilated, costa moderately arched, apex obtuse, termen slightly rounded, somewhat oblique; whitish-ochreous, slightly sprinkled with dark fuscous; a blackish dot on base of costa; stigmata dark fuscous, plical obliquely beyond first discal; a strongly angulated series of dark fuscous dots running rather near margin from beneath costa at ⅔ to above tornus: cilia whitish-ochreous. Hindwings and cilia ochreous-grey-whitish.

BRAZIL, Petropolis; one specimen.

Machimia chlorochroa, n. sp.

♂ ♀. 27–28 mm. Head, thorax, and abdomen pale whitish-ochreous. Palpi ochreous-whitish, second joint slightly fuscous-tinged. Antennal ciliations in ♂ 1½. Forewings elongate, costa gently arched, apex obtuse, termen rounded, rather oblique; in ♂ pale greyish-ochreous, in ♀ whitish-ochreous with a faint median longitudinal streak indicated by some greyish scales; discal stigmata obscure, fuscous, in ♀ more marked: cilia ochreous-whitish. Hindwings in ♂ whitish-grey-ochreous, in ♀ pale whitish-ochreous; cilia ochreous-whitish.

ARGENTINA, Parana; two specimens.

Machimia concinna, n. sp.

♀. 17–19 mm. Head and thorax light greyish-flesh-colour. Palpi white more or less sprinkled with dark fuscous, basal half of second

joint grey. Abdomen grey. Forewings elongate, moderate, posteriorly slightly dilated, costa moderately arched, apex rounded-obtuse, termen slightly rounded, almost vertical; pinkish-grey, terminal edge pink; a blackish dot on base of costa; stigmata blackish, plical obliquely beyond first discal; a strongly curved series of blackish dots running rather near margin from beneath costa beyond middle to dorsum before tornus, somewhat impressed opposite apex: cilia ochreous-grey-whitish, base pinkish. Hindwings grey, darker posteriorly; cilia grey-whitish, becoming grey towards base.

Dutch Guiana, Paramaribo, in November; Venezuela, Ciudad Bolivar, in May and July; four specimens.

Machimia languida, n. sp.

♂. 15 mm. Head and thorax pale pinkish, slightly sprinkled with grey. Palpi rosy-whitish, with a few grey specks. Antennal ciliations 1. Abdomen ochreous-whitish. Forewings elongate, posteriorly slightly dilated, costa gently arched, apex obtuse, termen slightly rounded, somewhat oblique; dull pink, sprinkled with grey; stigmata formed of blackish irroration, plical obliquely beyond first discal; a strongly curved transverse series of subconfluent dots of blackish irroration rather near tornus, obsolete towards costa and dorsum: cilia grey, towards base pinkish. Hindwings ochreous-whitish, towards apex more ochreous-tinged; cilia ochreous-whitish.

Venezuela, Ciudad Bolivar, in May; one specimen.

Machimia erotias, n. sp.

♂. 30 mm. Head, palpi, and thorax purplish-pink. Antennal ciliations $2\frac{1}{2}$. Abdomen light yellow-ochreous, faintly rosy-tinged. Forewings moderately broad, posteriorly slightly dilated, costa moderately arched, apex rounded-obtuse, termen slightly rounded, hardly oblique; light rosy-pink, partially shaded with light purplish-fuscous, especially towards costa, costal edge pale pink; stigmata dark purplish-fuscous, plical obliquely beyond first discal; a curved transverse series of obscure purplish-fuscous dots at $\frac{5}{6}$, obsolete towards margins: cilia rosy-pink, with purplish-fuscous subbasal shade. Hindwings light rosy-pink, towards base suffused with pale yellowish; cilia pale pinkish.

Colombia, San Antonio, 5,800 feet, in November; one specimen.

Machimia phaeocrossa, n. sp.

♂. 18–19 mm. Head and thorax ochreous-yellow mixed with crimson. Palpi ochreous-yellowish, suffused with crimson externally except on apical half of terminal joint. Antennal ciliations 4. Abdomen whitish-ochreous. Forewings elongate, moderate, posteriorly dilated, costa gently arched, apex rounded-obtuse, termen almost straight, nearly vertical; ochreous-yellow, veins and margins broadly suffused with light crimson; costa narrowly dark grey; stigmata grey, plical obliquely beyond first discal, an additional dot before and above second discal; a strongly curved grey line, partially interrupted into dots, running from $\frac{2}{3}$ of costa to $\frac{2}{3}$ of dorsum, indented towards dorsum; some grey dots on termen: cilia grey, with obscure darker bars. Hindwings and cilia whitish-yellowish, cilia with a faint rosy tinge.

Brazil, Petropolis; two specimens.

Machimia haemataula, n. sp.

♂ ♀. 20–22 mm. Head ochreous-yellowish, crown posteriorly suffused with crimson. Palpi whitish-yellowish, second joint externally crimson except apex, basal half of terminal joint crimson. Antennal ciliations of ♂ 3. Thorax ochreous-yellow reticulated with crimson. Abdomen ochreous-whitish. Forewings elongate, moderate, rather dilated posteriorly, costa gently arched, apex rounded-obtuse, termen almost straight, little oblique; ochreous-yellow, veins and margins streaked with deep crimson; a slender dark fuscous streak runs all round costa and termen, on costa rather broadly suffused beneath, but leaving extreme costal edge crimson; two crimson dots in yellow spaces towards base; an oblique rather dark fuscous fascia edged with deep crimson crosses wing before middle, dilated towards dorsum; a rather dark fuscous blotch across end of cell, edged with deep crimson; a rather strongly curved fuscous line edged with crimson from costa at $\frac{2}{3}$ to above tornus: cilia ochreous-grey-whitish, basal third crimson. Hindwings pale whitish-ochreous, termen rosy-tinged; cilia pale whitish-ochreous.

Brazil, São Paulo; two specimens.

Machimia trygaula, n. sp.

♂ ♀. 19–22 mm. Head light ochreous-yellowish, with a crimson streak on each side of face, crown sometimes tinged with crimson Palpi yellow-whitish, second joint externally rose-pink except towards apex, lower half of terminal joint rose-pink. Antennal

ciliations in ♂ 2½. Thorax pale yellowish, interruptedly streaked longitudinally with deep crimson. Abdomen ochreous-whitish. Forewings elongate, posteriorly slightly dilated, costa gently arched, apex obtuse, termen slightly rounded, somewhat oblique ; ochreous-yellow, veins and margins marked with brownish-red lines ; costa from base to $\frac{1}{3}$ broadly suffused with brown-red, mixed with dark fuscous suffusion, lower edge of this connected with dorsum near base by an inwardly oblique dark red line, and emitting a short dark fuscous projection at $\frac{1}{3}$ of wing, and a stronger one on end of cell, whence a dark red line mixed with dark fuscous runs obliquely inwards to $\frac{1}{3}$ of dorsum, basal half of dorsum suffused with rather dark fuscous; a fine denticulate strongly curved dark reddish line sometimes mixed with dark fuscous running from $\frac{2}{3}$ of costa to $\frac{2}{3}$ of dorsum ; a fine dark fuscous streak interrupted with reddish running round posterior part of costa and termen: cilia pale greyish. Hindwings and cilia whitish.

Brazil, São Paulo, Petropolis ; three specimens.

Coptotelia, Z.

This name supersedes *Gonionota*, Z. The scaling of the labial palpi varies to some extent, the projection on the terminal joint may be almost obsolete, and vein 7 of forewings may run either to apex or termen, but the genus remains easily recognisable by other characters.

Coptotelia miltopa, n. sp.

♂. 23 mm. Head yellow. Palpi pale yellow, second joint expanded with rough scales towards apex above and beneath, tinged at apex with ferruginous, terminal joint more than half second, slender. Thorax lilac-brownish, suffused with blackish except anteriorly. Abdomen dark grey. Forewings suboblong, rather broad, posteriorly dilated, costa strongly arched, apex rounded-obtuse, termen slightly rounded, hardly oblique ; 7 to apex; dark purplish-fuscous suffusedly mixed with blackish ; a bright yellow stripe of uneven width running all round costa and termen to near tornus, widest near base and at apex, attenuated towards extremity, lower edge suffused with fulvous-brown ; a bright red oval spot in disc before middle, edged beneath by an elongate sometimes interrupted snow-white mark, its anterior extremity enlarged and surrounded by scattered crimson scales ; second discal stigma curved-transverse, indicated by obscure crimson edging: cilia yellow,

towards tornus dark fuscous. Hindwings dark grey; cell whitish-grey, tinged posteriorly with rosy; cilia grey, becoming whitish round apex.

COLOMBIA, San Antonio, 5,800 feet, in November; one specimen.

Coptotelia psittacopa, n. sp.

♂. 19 mm. Head yellow, with dark bronzy spot on sides of face, sides of crown mixed with dark bronzy. Palpi deep bronzy, terminal joint half second, its base and apex pale yellowish. Thorax yellow reticulated with crimson-red, margins deep bronzy. Abdomen dark fuscous. Forewings elongate, moderate, somewhat dilated posteriorly, costa moderately arched, apex obtuse, termen rounded, rather oblique; 7 to termen; deep bronzy-brown largely suffused with purple-blackish; a large yellow basal patch reticulated with bright crimson-red, not reaching dorsum, irregularly marked with dark fuscous towards costa, outer edge angulated in middle; first discal stigma represented by a black dot within angle of basal patch, second by an irregular roundish yellow spot containing a suffused crimson-red ring; yellow transverse spots marked beneath with crimson-red on costa before middle and at $\frac{2}{3}$; a subterminal series of pale yellowish dots: cilia pale yellowish, at apex and towards tornus suffused with purple-blackish. Hindwings and cilia dark fuscous.

COLOMBIA, at 4,400 feet, in February; one specimen.

Coptotelia thyridopa, n. sp.

I propose this name for *fenestella*, Zell., Verh. Zool. Ges. Wien., 1874, 439, which I consider referable here, inasmuch as the type-species of the genus is *fenestrella*, Zell., Stett. Ent. Zeit., 1863, 145, and though not absolutely identical, the two names would obviously lead to confusion if employed in the same genus.

Coptotelia constellata, n. sp.

♂. 19 mm. Head and thorax grey mixed with dark grey. Palpi rather dark fuscous, terminal joint more than half second, tip whitish. Abdomen grey. Forewings suboblong, moderately broad, costa anteriorly strongly, posteriorly slightly arched, apex obtuse, termen faintly sinuate, somewhat oblique; 7 to termen; brown irregularly mixed with dark fuscous; a small pale yellow spot in middle of base, and one on costa near base; first discal stigma minute, yellow, second white, with some yellow scales and small

marks round it and a small yellow spot beyond it; small yellow spots on costa at $\frac{2}{5}$ and $\frac{3}{4}$, one at apex, and some scattered scales or small marks towards costa posteriorly; a terminal fascia of dark fuscous suffusion: cilia dark fuscous. Hindwings light grey; cilia pale greyish, with dark fuscous subbasal shade.

COLOMBIA, San Antonio, 5,800 feet, in November; one specimen.

Coptotelia acrocosma, n. sp.

♂. 19 mm. Head pale greyish-ochreous. Palpi brownish, terminal joint about half second. Thorax brown with central white stripe. Abdomen grey. Forewings broad, suboblong, broadest in middle, costa anteriorly rather strongly arched, posteriorly almost straight, apex rounded-obtuse, termen rounded, little oblique; 7 to apex; deep purplish-brown; basal third lighter brown, outer edge straight, inwardly oblique, costal edge pinkish; dorsum beyond this darker-suffused; first discal stigma represented by a few white scales, second by a few dark fuscous and whitish; costal edge towards middle dark fuscous, posteriorly suffused with ferruginous-yellow tipped with rose-pink: cilia dark brownish, on posterior $\frac{2}{5}$ of costa snow-white. Hindwings and cilia grey.

COLOMBIA, San Antonio, 5,800 feet, in November; one specimen.

Coptotelia hydrogramma, n. sp.

♂. 21–22 mm. Head brownish-rosy sprinkled with whitish. Palpi rosy irrorated with dark fuscous, terminal joint about half second. Thorax rosy-brown. Abdomen dark grey. Forewings broad, suboblong, costa anteriorly strongly, posteriorly slightly arched, apex rounded-obtuse, termen rounded, rather oblique; 7 to termen; brown, with irregular pale transverse striae; posterior $\frac{2}{3}$ of costal edge rosy slightly tipped with white cilia, with a small oblique rosy mark at $\frac{2}{5}$ and another mixed with white at $\frac{4}{5}$; first discal stigma blackish, plical minute, blackish, rather beyond it, second discal represented by a minute transverse linear white mark; a dark brown dorsal streak from $\frac{1}{3}$ to near tornus, attenuated posteriorly, edged above with rosy-pinkish suffusion; some indistinct blackish irroration towards termen, tending to form subterminal and terminal series of spots: cilia brownish. Hindwings dark grey; cilia grey.

COLOMBIA, San Antonio, 5,800 feet, in November; two specimens.

Coptotelia amphicrena, n. sp.

♂. 19 mm. Head, palpi, and thorax bronzy-brown, terminal joint less than half second, suffused with pale ochreous. Abdomen ochreous-whitish. Forewings suboblong, moderately broad, costa anteriorly rather strongly arched, sinuate beyond middle, apex obtuse, termen almost straight, nearly vertical ; 7 to apex ; bronzy-brown ; discal stigmata dark fuscous ; a small white spot on costa before middle, and another semioval in sinuation midway between first and apex ; a curved row of dark fuscous dots crossing wing from second costal spot to near dorsum before tornus : cilia brownish. Hindwings whitish, suffused with very pale brownish towards apex ; cilia whitish.

COLOMBIA, San Antonio, 5,800 feet, in November; one specimen.

Coptotelia ioleuca, n. sp.

♂. 19 mm. Head pale ochreous, sides of crown infuscated. Palpi brownish, terminal joint slightly over half second, ochreous-whitish somewhat sprinkled with brownish. Thorax pale ochreous sprinkled with brown-reddish, suffused with fuscous towards margins. Abdomen ochreous-whitish. Forewings suboblong, moderate, costa anteriorly moderately arched, posteriorly almost straight, apex obtuse, termen rounded, somewhat oblique; 7 to termen ; fuscous, sprinkled with dark fuscous ; a pale yellowish basal patch reticulated with ferruginous occupying $\frac{2}{3}$ of wing, including a broad fuscous costal streak, outer edge curved ; first discal stigma represented by a round snow-white spot within edge of basal patch, second by a white dot edged with ferruginous ; a small pale yellowish triangular spot edged with ferruginous on costa at $\frac{2}{3}$, whence a strongly curved series of dots of dark fuscous irroration runs near margins to dorsum at $\frac{2}{3}$: cilia fuscous, on costal edge whitish. Hindwings and cilia ochreous-whitish.

ARGENTINA, Parana ; one specimen.

Coptotelia lecithitis, n. sp.

♂ ♀. 15–18 mm. Head and thorax ochreous-yellowish more or less suffused with ferruginous-brownish. Palpi ochreous-brown, terminal joint half second. Abdomen ochreous-whitish. Forewings oblong, moderate, costa anteriorly strongly arched, posteriorly almost straight, apex rounded-obtuse, termen rounded, little oblique ; 7 to apex ; ferruginous-brownish, sometimes sprinkled with dark fuscous;

an ochreous-yellowish basal patch occupying nearly $\frac{2}{3}$ of wing, reticulated with ferruginous-brownish and marked with a brown costal streak, outer edge curved; first discal stigma small, white, with some dark fuscous scales, second dark fuscous, preceded by pale yellowish suffusion; a small oblique suffused white mark on costa at $\frac{2}{3}$, and some white irroration beyond this; a streak of blackish irroration between veins 2 and 3; sometimes a subterminal series of cloudy blackish dots; a cloudy dark fuscous terminal line or series of dots: cilia whitish-ochreous, with an interrupted dark fuscous subbasal shade, outer half white on upper part of termen. Hindwings and cilia ochreous-whitish.

ARGENTINA, Parana; nine specimens.

Cryptolechia holopyrrha, n. sp.

♂. 28–38 mm. Head, palpi, and thorax deep ferruginous-brown, terminal joint of palpi grey-whitish, shorter than second. Antennae with short scattered cilia. Abdomen reddish-fuscous. Forewings suboblong, costa moderately arched, apex obtuse, termen slightly rounded, little oblique, 7 to apex; deep ferruginous-brown; stigmata obscure, cloudy, darker, plical rather beyond first discal; a very faint paler strongly curved subterminal line: cilia deep ferruginous-brown. Hindwings and cilia from pale to rather dark reddish-fuscous.

COLOMBIA, San Antonio, 5,800 feet, in November; three specimens.

Cryptolechia chordostoma, n. sp.

♂ ♀. 22–24 mm. Head and thorax dark purplish-fuscous. Palpi white, longitudinally lined with dark fuscous, terminal joint in ♂ considerably, in ♀ hardly longer than second. Antennae in ♂ shortly ciliated ($\frac{1}{2}$). Abdomen rather dark fuscous, segmental margins whitish. Forewings elongate, rather narrow, posteriorly slightly dilated, costa slightly arched, apex obtuse, termen slightly rounded, oblique, 7 to costa; dark purplish-fuscous sprinkled with blackish and whitish; stigmata obscure, cloudy, blackish, plical somewhat beyond first discal; a faint pale bowed subterminal line hardly indicated, obscurely whitish on costa: cilia fuscous sprinkled with whitish. Hindwings grey-whitish, becoming pale grey posteriorly; cilia grey-whitish, greyer towards base.

ARGENTINA, Parana; two specimens.

Himotica, n. g.

Head with appressed scales, sidetufts loose ; ocelli small ; tongue developed. Antennae ¾, in ♂ serrate, shortly and unevenly ciliated, basal joint moderately elongate, without pecten. Labial palpi with second joint extremely long, slightly curved, with long dense rough projecting scales above throughout, terminal joint less than half second, moderate, acute, ascending. Maxillary palpi very short, loosely scaled, appressed to tongue. Posterior tibiae rough-scaled above. Forewings with 2 and 3 stalked, 7 absent, 11 from before middle. Hindwings 1, elongate-ovate, cilia ⅔; 3 and 4 connate, 5–7 parallel.

Himotica thyrsitis, n. sp.

♂. 23 mm. Head, palpi, thorax, and abdomen whitish-ochreous, palpi slightly tinged with brownish. Forewings elongate, rather narrow, costa anteriorly gently, posteriorly strongly arched, apex obtuse, termen very obliquely rounded ; ochreous-whitish ; upper part of cell posteriorly, and whole space between cell and termen except towards costa suffused with light brownish-ochreous, with more or less pale streaks on veins, and some dark fuscous suffusion between veins, especially posteriorly ; a fuscous marginal line round apex : cilia on costa ochreous-whitish with greyish subbasal shade, on termen ashy-fuscous. Hindwings grey, costa whitish-suffused to apex ; cilia grey-whitish with grey subbasal shade, above apex whiter.

Brazil, São Paulo ; one specimen.

XYLORYCTIDAE.

Xylorycta navigatrix, n. sp.

♂. 25 mm. Head and thorax white. Palpi white, second joint dark grey except towards apex. Antennal ciliations very short. Abdomen grey-whitish. Forewings elongate, posteriorly somewhat dilated, costa moderately arched, apex obtuse-pointed, termen almost straight, rather oblique ; 7 to apex ; shining white, with a faint ochreous tinge ; an irregular blackish spot on base of costa ; an irregular-edged triangular blackish patch occupying median third of costa and reaching half across wing ; an indistinct cloudy light grey curved shade from ⅔ of costa to dorsum before tornus ; some faint light grey suffusion towards apex : cilia white. Hindwings ochreous-whitish ; cilia white.

Colombia, San Antonio, 5,800 feet, in November ; one specimen.

Plocamosaris, n. g.

Head with appressed scales; ocelli absent; tongue developed. Antennae $\frac{3}{4}$, in ♂ slender, serrulate, ciliated, basal joint elongate, without pecten. Labial palpi very long, curved, ascending, second joint long, laterally compressed, expanded beneath with dense rough scales and above with long rough projecting hairs, terminal joint about half second, slender, acute. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiae shortly rough-scaled above. Forewings with 2 from $\frac{5}{6}$, 3 absent, 4 from angle, 7 absent, 11 from middle. Hindwings over 1, trapezoidal, cilia $\frac{2}{3}$; 3 and 4 connate, 5 absent, 6 and 7 remote, divergent.

A curious form of doubtful affinity.

Plocamosaris pandora, n. sp.

♂. 20 mm. Head and thorax ferruginous-ochreous, face paler. Palpi yellow-ochreous, hairs of upper edge brownish-tinged, terminal joint ochreous-whitish. Antennal ciliations 1. Abdomen pale ochreous-yellowish. Forewings elongate, rather narrow, costa anteriorly strongly, posteriorly moderately arched, sinuate in middle, apex obtuse, termen slightly sinuate, somewhat oblique; ferruginous-ochreous, tinged with brownish, deepest towards costal sinuation; second discal stigma obscurely brown; a transverse streak of brownish suffusion immediately before termen: cilia ferruginous-ochreous. Hindwings and cilia pale ochreous-yellow.

Brazil, Petropolis; one specimen.

STENOMIDAE.

Timocratica, n. g.

Head with appressed scales, sidetufts loosely raised; ocelli absent; tongue developed. Antennae $\frac{3}{4}$, in ♂ rather strongly ciliated, basal joint much thickened with dense rough scales anteriorly. Labial palpi moderately long, recurved, second joint much thickened with dense scales, rough beneath towards apex, terminal joint rather shorter than second, moderate, acute. Maxillary palpi very short, filiform, appressed to tongue. Anterior tibiae and tarsi thickened with scales, posterior tibiae and basal joint of tarsi clothed with long rough hairscales above. Forewings with 2 and 3 stalked, 4 and 5 rather approximated at base, 6–8 approximated at base, 7 to apex, 11 from before middle. Hindwings over 1, ovate, cilia $\frac{1}{3}$; 3 and 4

connate, 5 approximated at base; 6 and 7 approximated towards base.

Based on the following species, but probably *tristrigata*, Zell., and *major*, Busck, also belong here.

Timocratica isographa, n. sp.

♂. 52 mm. Head whitish-ochreous. Palpi with second joint dull orange, upper longitudinal half blackish, terminal joint whitish-fuscous. Antennal ciliations $1\frac{1}{4}$. Thorax brownish, base of scales whitish. Abdomen pale orange-ochreous. Forewings elongate, rather dilated posteriorly, costa anteriorly moderately, posteriorly more strongly arched, apex rounded, termen rounded, rather oblique; fuscous, base of scales whitish; costal and dorsal edge ferruginous-brown; three straight parallel oblique ferruginous-brown transverse lines not quite reaching margins, first from $\frac{1}{4}$ of costa to beyond middle of dorsum, second from middle of costa to tornus, third from before $\frac{2}{3}$ of costa to below middle of termen: cilia fuscous, basal third ferruginous-brown. Hindwings and cilia pale ochreous-orange.

Venezuela, Palma Sola; one specimen. In one forewing 7 and 8 appear to be short-stalked, but on close examination it appears rather that the base of 7 is obsolete and its lower extremity appressed to 8.

Prasolithites, n. g.

Head loosely scaled; ocelli absent; tongue developed. Antennae $\frac{2}{3}$, in ♂ strongly ciliated, basal joint thickened with dense scales. Labial palpi long, recurved, second joint thickened with appressed scales, terminal joint shorter than second, moderate, acute. Maxillary palpi very short, filiform, appressed to tongue. Posterior tibiae rough-scaled above. Forewings with 2 from near angle, 3 and 4 approximated at base, 6 to apex, 7 and 8 approximated at base, 11 from before middle. Hindwings over 1, trapezoidal-ovate, cilia $\frac{1}{3}$; 3, 4, 5 approximated at base, 6 and 7 approximated towards base.

Prasolithites virens, n. sp.

♂. 32 mm. Head and thorax fuscous. Palpi fulvous-brown, terminal joint whitish except base. Antennal ciliations 2. Abdomen light grey. Forewings elongate, moderate, posteriorly slightly dilated, costa strongly arched, apex rounded, termen rounded, rather oblique; greenish-fuscous; costal edge fulvous-brown, edged beneath

with violet suffusion from base to beyond middle; a small violet-white oblique mark beneath costa at $\frac{2}{3}$; a large dull green patch occupying nearly apical half of wing, its anterior edge running from about middle of costa to $\frac{2}{3}$ of dorsum, but with its upper $\frac{2}{5}$ forming a broad triangular projection which extends inwards to above fold at $\frac{1}{4}$, groundcolour beneath this projection somewhat prominent outwardly and including a small indistinct group of whitish scales: cilia fuscous, basal third brownish, tips whitish-tinged. Hindwings whitish-ochreous, basal $\frac{2}{3}$ tinged with light fuscous; cilia whitish-ochreous.

COLOMBIA, at 4,400 feet, in February; one specimen.

Antaeotricha mesostrota, n. sp.

♂. 17 mm. Head and thorax white. Palpi white, second joint grey except apex, terminal joint $\frac{1}{3}$. Antennal ciliations 2. Abdomen light grey. Forewings elongate, narrowed posteriorly, costa moderately arched, apex rounded, termen rounded, little oblique; white; a patch of pale grey suffusion on basal third of costa, reaching half across wing, posterior edge irregularly prominent in disc, costal edge dark grey, plical stigma small, dark grey, forming angle of this patch; second discal stigma large, blackish; an oblique fuscous fascia crossing wing beyond this, darkest on costal edge; some fuscous irroration towards apex; a series of blackish marginal dots round apex and termen: cilia whitish, with two fuscous shades. Hindwings fuscous-whitish, more fuscous-tinged posteriorly; a whitish-ochreous hairpencil extending in disc through cell from base to $\frac{2}{3}$; costa roughened with short projecting grey scales from near base to near middle; cilia fuscous-whitish, with fuscous basal line.

VENEZUELA, Carupano, in December; one specimen.

Antaeotricha ophrysta, n. sp.

♂. 25 mm. Head white, sides of face grey. Palpi grey, second joint dark grey on upper longitudinal half, ochreous-yellowish beneath, terminal joint $\frac{2}{3}$, whitish except towards base. Antennal ciliations 1. Thorax white, shoulders tinged with grey. Abdomen whitish-grey, anal tuft tinged with yellowish. Forewings elongate, broadest in middle, narrowed posteriorly, costa moderately arched, apex rounded, termen rounded, little oblique; white; a suffused grey streak along basal third of costa; a very faint transverse dorsal patch of pale grey suffusion before middle; a spot of pale grey suffusion on dorsum beyond middle; a moderately broad curved

light grey fascia from beneath middle of costa to tornus; second discal stigma blackish, closely preceding this ; a series of four grey spots confluent on margin traversing apex : cilia grey. Hindwings white, apical half light grey ; an expansible fringe of long ochreous-whitish hairs extending along vein 8 from base to $\frac{2}{3}$ of wing, vein strongly sinuate beyond this ; costa with long projecting rough grey and whitish scales from base to $\frac{3}{4}$; cilia white, basal third grey.

Dutch Guiana, Onoribo, in January and March ; two specimens.

Antaeotricha xanthoptila, n. sp.

♂. 30 mm. Head and thorax white, shoulders with a grey spot. Palpi grey, second joint dark grey on upper longitudinal half, ochreous-whitish towards base beneath, terminal joint $\frac{3}{5}$, white except towards base. Antennal ciliations $1\frac{1}{2}$. Abdomen grey-whitish. Forewings elongate, broadest in middle, narrowed posteriorly, costa strongly arched, apex rounded, termen rounded, little oblique ; white ; a dark grey blotch occupying basal fourth of costa and reaching half across wing ; a faint dorsal patch of grey suffusion before $\frac{1}{3}$, its dorsal edge forming a projecting tuft of raised ochreous-yellowish and dark grey scales ; large median and smaller tornal blotches of faint pale grey suffusion, reaching more than half across wing, confluent dorsally ; second discal stigma dark fuscous ; an elongate patch of grey suffusion from beneath middle of costa to upper anterior angle of tornal blotch ; apex narrowly light grey : cilia white. Hindwings white with a faint ochreous tinge ; an expansible fringe of long ochreous-whitish hairs lying along vein 8 in an ochreous-yellow subcostal groove, vein sinuate beyond this ; costa from base to $\frac{3}{4}$ with long rough projecting grey and whitish scales, longest in middle ; cilia white.

Dutch Guiana, interior, in August ; one specimen. Near *basalis,* Zell.

Antaeotricha praecisa, n. sp.

♂ ♀. 20–25 mm. Head and thorax dark fuscous with indigo-blue reflections, face whitish. Palpi dark fuscous, terminal joint $\frac{2}{3}$, suffused with whitish except base. Antennal ciliations $2\frac{1}{2}$. Abdomen grey-whitish. Forewings elongate, costa moderately arched, apex rounded, termen rounded, little oblique ; a dark fuscous patch with purplish-leaden reflections and irregularly mixed with blackish extending from base of costa along dorsum to $\frac{2}{3}$, reaching $\frac{2}{3}$ across wing and posteriorly truncate, angle edged with black ; two irregular transverse

fuscous shades beyond this, first with costal extremity obsolete or represented by a cloudy dot beneath middle of costa, second sometimes reaching costa at $\frac{3}{4}$; a third shade indicated by a tornal mark and a small black costal spot: cilia white. Hindwings whitish-grey; in ♂ a subcostal pencil of long whitish hairs reaching from base to middle; costal edge in ♂ with projection of grey scales before middle; cilia whitish.

Brazil, Rio de Janeiro, São Paulo; three specimens. Near *bicolor*, Zell.

Antaeotricha carphitis, n. sp.

♂. 24 mm. Head and thorax light grey, face white. Palpi with second joint grey-whitish, dark grey above, terminal joint $\frac{2}{3}$, whitish-grey. Antennal ciliations $1\frac{1}{2}$. Abdomen grey. Forewings elongate, rather narrow, costa gently arched, apex rounded, termen rounded, somewhat oblique; white; basal area tinged with pale ochreous and grey, terminated on costa by an oblique dark grey spot before $\frac{1}{3}$; a dark grey semioval blotch extending along dorsum from near base to near tornus, reaching in middle nearly half across wing, upper edge with a ferruginous-brown projection before middle, discal area tinged with pale ochreous beyond this; a pale grey oblique spot from costa before middle, connected on costa with a grey streak from middle of costa to beneath costa at $\frac{2}{3}$; a dark brown transverse blotch from tornus reaching $\frac{2}{3}$ across wing, preceded and followed by ochreous-grey suffusion; a confluent series of small ferruginous-brown spots before termen, obsolete at apex, but with a small brownish spot above it: cilia bronzy-brownish, at apex and on costa white. Hindwings grey, whitish in cell and along costa; a slender grey hairpencil extending beneath costa from base to middle; costa with very long projecting rough grey scales from base to beyond middle; cilia pale grey with darker subbasal line, at apex whitish.

Brazil, Santa Caterina; one specimen.

Antaeotricha corvula, n. sp.

♂. 21 mm. Head, thorax, and abdomen dark fuscous. Palpi fuscous, terminal joint 1. Antennal ciliations 3. Forewings elongate, posteriorly slightly dilated, costa gently arched, apex rounded termen rounded, rather oblique; dark purplish-fuscous; plical stigma black, connected with base by a fine blackish line along fold; second discal stigma black, followed by some slight scattered yellow-whitish irroration: cilia purplish-fuscous. Hindwings dark fuscous;

no hairpencil ; costa with long dense projecting dark grey scales from near base to middle, sinuate beyond this, with a small tuft of scales beyond sinuation ; cilia fuscous, darker towards base.

COLOMBIA, San Antonio, 5,800 feet, in November ; one specimen.

Orphnolechia bathrogramma, n. sp.

♀. 12 mm. Head and thorax ochreous-whitish sprinkled with ochreous, face whitish. Palpi ochreous-whitish, terminal joint with an indistinct fuscous subapical ring. Abdomen ochreous-whitish. Forewings elongate, costa anteriorly moderately, posteriorly slightly arched, apex rounded, termen rounded, rather oblique ; 8 and 9 closely approximated almost throughout ; whitish closely irrorated with brownish ; a dark fuscous streak from base of costa almost along dorsal edge to $\frac{1}{4}$ of dorsum ; plical stigma obliquely beyond first discal, both dark fuscous ; a slightly curved dark fuscous streak from beyond middle of costa to dorsum before tornus, more brownish posteriorly and edged with whitish anteriorly ; a curved series of several small dark fuscous spots crossing wing from $\frac{2}{3}$ of costa to tornus ; a series of dark fuscous marks round posterior part of costa and termen : cilia whitish. Hindwings grey-whitish ; cilia whitish.

VENEZUELA, Ciudad Bolivar, in May ; two specimens.

Stenoma megaleuca, n. sp.

♀. 54 mm. Head, thorax, and abdomen white. Palpi white, second joint yellow-ochreous except towards apex, above dark fuscous towards base, terminal joint $\frac{3}{4}$, apical half blackish. Forewings elongate, moderate, rather dilated posteriorly, costa moderately arched, apex rounded, termen rather obliquely rounded, 7 to apex ; white : cilia white. Hindwings and cilia white ; 6 and 7 stalked. Forewings beneath suffused with ochreous-yellowish except towards dorsum and termen.

COLOMBIA, Popayan ; one specimen. Closely allied to *albella*, Zell. In one forewing vein 3 is reduplicated, a curious abnormality.

Stenoma isomeris, n. sp.

♂. 19 mm. Head white, tinged with brownish on crown. Palpi with lower longitudinal half of second joint whitish-ochreous, upper fuscous, apex wholly white, terminal joint 1, white. Antennal ciliations 2. Thorax light brownish. Abdomen ochreous-whitish.

Forewings elongate, costa moderately arched, apex rounded, termen rounded, little oblique, 7 to apex; shining white; dorsal half brownish irregularly sprinkled with dark fuscous, with a median dorsal spot of dark fuscous suffusion, discal stigmata forming dark fuscous dots on upper edge of dividing line; some dark fuscous dots round apex and termen: cilia white, on brownish area concolorous. Hindwings and cilia pale whitish-ochreous; 3 and 4 stalked, 6 and 7 short-stalked.

Brazil, Tijuco, in December; one specimen.

Stenoma melanesia, n. sp.

♂. 18 mm. Head white, crown suffused with pale brownish. Palpi with second joint grey, apex white, terminal joint white, infuscated anteriorly except at apex. Antennal ciliations 1. Thorax light brownish, posterior half blackish. Abdomen blackish. Forewings elongate, costa rather strongly arched, apex rounded, termen rounded, rather oblique, 7 to costa (apparent); light bronzy-brownish; a small blackish spot on costa at $\frac{1}{4}$; a slightly outwards-curved series of six small black spots from costa before middle to base of dorsum, and a strongly outwards-curved series of small black spots from costa beyond middle to tornus, area between these wholly strewn with small black spots and suffused with ashy-grey except a suffused spot of groundcolour towards middle of dorsum: cilia light brownish. Hindwings with 3 and 4 stalked, 6 and 7 stalked; dark fuscous; cilia light fuscous, with darker subbasal shade.

Colombia, at 4,400 feet, in February; one specimen.

Stenoma glaucopa, n. sp.

♀. 38 mm. Head rosy-fulvous. Palpi dark brown, terminal joint $\frac{4}{5}$, whitish. Thorax ferruginous-brown. Abdomen grey. Forewings elongate, posteriorly considerably dilated, costa strongly arched, apex rounded, termen rounded, somewhat oblique, 7 to apex; ferruginous-brown, orange-tinged towards costa anteriorly; costal edge crimson, becoming ferruginous posteriorly; second discal stigma large, round, whitish, centred with dark grey: cilia ferruginous-brown. Hindwings and cilia grey; 6 and 7 nearly approximated towards base.

Colombia, San Antonio, 5,800 feet, in November; one specimen.

Stenoma trichorda, n. sp.

♂. 35–45 mm. Head pale fuscous, face whitish. Palpi with second joint fuscous, whitish towards apex, terminal joint $\frac{5}{8}$, fuscous-whitish. Antennal ciliations $2\frac{1}{2}$. Thorax light fuscous irrorated with darker. Abdomen whitish-fuscous. Forewings elongate, posteriorly slightly dilated, costa gently arched, apex obtuse, termen rounded, somewhat oblique, 7 to termen, 8 to costa; fuscous, base of scales whitish; costal edge yellow-whitish; three cloudy dark brown lines, first almost straight, from beneath costa at $\frac{1}{4}$ to middle of dorsum, second slightly curved, from middle of costa to $\frac{4}{5}$ of dorsum, third moderately curved from $\frac{3}{4}$ of costa to dorsum before tornus; second discal stigma on second line, obscurely darker; a series of indistinct darker dots round apex and termen: cilia grey-whitish obscurely barred with light fuscous. Hindwings with 6 and 7 stalked; light fuscous; cilia whitish, with fuscous subbasal line.

COLOMBIA, San Antonio, 5,800 feet, in November and December; eleven specimens.

Stenoma byrsinitis, n. sp.

♂ ♀. 25–30 mm. Head and thorax fuscous, forehead suffused with whitish. Palpi whitish, second joint fuscous except towards apex, terminal joint 1. Antennal ciliations of ♂ 2. Abdomen pale fuscous. Forewings elongate, moderate, posteriorly rather dilated, costa gently arched, apex rounded-obtuse, termen rounded, little oblique; 7 to apex; in ♂ greyish-ochreous or pale fuscous, paler-suffused before subterminal line, in ♀ fuscous, somewhat sprinkled with dark fuscous; costal edge ochreous-whitish; stigmata dark fuscous, plical rather obliquely beyond first discal; a rather curved cloudy dark fuscous transverse shade passing behind second discal; a curved series of cloudy dark fuscous lunulate marks from $\frac{4}{5}$ of costa to dorsum before tornus; a series of blackish dots round apex and termen: cilia whitish-ochreous obscurely barred with fuscous. Hindwings with 6 and 7 closely approximated towards base; grey, rather darker in ♀; cilia pale greyish, with darker subbasal shade.

COLOMBIA, San Antonio, 5,800 feet, in November and December; nine specimens.

Stenoma paurocentra, n. sp.

♂. 28–34 mm. Head and thorax pale brownish-ochreous, face whitish-ochreous. Palpi white, second joint grey except towards

apex, terminal joint $\frac{1}{2}$. Antennal ciliations 3. Abdomen pale greyish, anal tuft whitish-ochreous. Forewings elongate, moderate, posteriorly rather dilated, costa gently arched, apex obtuse, termen almost straight, little oblique; 7 to termen, 8 to costa; light brownish-ochreous; costal edge yellow-whitish; plical and second discal stigmata blackish; a curved subterminal series of dots indicated by two or three blackish scales each, not reaching either margin: cilia whitish-ochreous. Hindwings with 6 and 7 short-stalked; whitish-fuscous; cilia whitish, with grey subbasal line.

Colombia, San Antonio, 4,400–5,800 feet, in November; two specimens.

Stenoma pelinitis, n. sp.

♂. 34–38 mm. Head and thorax pale brownish-ochreous, face whitish-ochreous. Palpi whitish, second joint fuscous except towards apex, terminal joint 1. Antennal ciliations $2\frac{1}{2}$. Abdomen pale greyish-ochreous. Forewings elongate, moderate, somewhat dilated posteriorly, costa gently arched, apex obtuse, termen slightly rounded, little oblique; 7 to termen, 8 to costa; light greyish-ochreous, more or less sprinkled with dark brown; costal edge ochreous-whitish; stigmata dark fuscous or blackish, plical obliquely beyond first discal; a cloudy fuscous transverse shade at $\frac{3}{5}$, strongly curved outwards in disc round second discal stigma; a similarly curved subterminal series of dark fuscous dots; a series of dark fuscous dots round apex and termen: cilia whitish-ochreous, yellower towards base. Hindwings with 6 and 7 approximated towards base; whitish-ochreous, sometimes faintly tinged with fuscous; cilia whitish-ochreous, sometimes infuscated round apex.

Colombia, San Antonio, 5,800 feet, in November and December; eleven specimens.

Stenoma phaeophanes, n. sp.

♂ ♀. 24–27 mm. Head and thorax fuscous, face whitish-fuscous. Palpi light fuscous, terminal joint $\frac{3}{4}$. Antennal ciliations of ♂ 1. Abdomen dark grey. Forewings elongate, posteriorly dilated, costa gently arched, apex obtuse, termen slightly rounded, in ♂ somewhat prominent, in ♀ vertical, 8 to apex; bronzy-fuscous; three very faint darker transverse lines, first two hardly curved, first from $\frac{1}{4}$ of costa to middle of dorsum, second from middle of costa to $\frac{3}{4}$ of dorsum, third irregularly curved from $\frac{3}{4}$ of costa to dorsum before tornus; second discal stigma dark fuscous, on second line: cilia

bronzy-fuscous. Hindwings with 6 and 7 approximated towards base; dark fuscous; cilia fuscous.

COLOMBIA, San Antonio, 5,800 feet, in November and December; two specimens.

Stenoma clavifera, n. sp.

♀. 23 mm. Head and thorax pale whitish-fuscous, thorax with some irregular ferruginous-brownish marks. Palpi pale brownish, terminal joint 1. Forewings elongate, moderate, posteriorly slightly dilated, costa anteriorly moderately, posteriorly slightly arched, apex obtuse, termen slightly rounded, little oblique; 7 to termen, 8 to costa; pale whitish-fuscous; markings ferruginous-brown; costal edge ferruginous-brownish; a transverse line from $\frac{1}{5}$ of costa to $\frac{1}{5}$ of dorsum, strongly angulated outwards above middle, with a posterior projection in middle, produced as a faint line through disc; plical stigma blackish; a slightly curved line from middle of costa to $\frac{3}{4}$ of dorsum, dilated at extremities, and in middle expanded posteriorly into a triangular spot containing a spot of groundcolour; groundcolour between this and following line tinged with ferruginous-brownish; a triangular spot on costa at $\frac{3}{4}$, whence a fine indistinct curved line runs to dorsum before tornus; a series of dots round apex and termen: cilia fuscous-whitish, basal third pale ferruginous-brownish limited by a dark brown line. Hindwings with 6 and 7 stalked; ochreous-whitish; cilia ochreous-whitish, with pale ferruginous subbasal line.

BRAZIL, São Paulo; one specimen.

Stenoma melanixa, n. sp.

♂. 26 mm. Head and thorax light brownish. Palpi brownish, terminal joint $\frac{3}{4}$, whitish except anteriorly. Antennal ciliations $1\frac{1}{4}$. Abdomen fuscous. Forewings elongate, moderate, posteriorly dilated, costa slightly arched, apex obtuse, termen slightly sinuate, little oblique, 8 to apex; fuscous, paler in disc, costa suffused with ferruginous-brown, darkest on edge, lower edge with faint projections at $\frac{1}{3}$ and $\frac{2}{3}$; second discal stigma indicated by a minute linear-transverse mark of several dark fuscous scales; a slender streak of blackish suffusion along dorsum from $\frac{1}{4}$ to near tornus; an indistinct conical projection of dark fuscous irroration reaching from dorsum at $\frac{2}{3}$ half across wing; a narrow whitish-grey terminal fascia, preceded on costa by a small black spot: cilia light ochreous-

brownish, paler towards tornus. Hindwings and cilia rather dark fuscous; 6 and 7 stalked.

COLOMBIA, Bogota; one specimen.

Stenoma macronota, n. sp.

♂ ♀. 24–27 mm. Head and thorax reddish-fuscous, face suffused with ferruginous. Palpi bright ferruginous, terminal joint ¾, whitish. Antennal ciliations of ♂ 2. Abdomen grey, anal tuft of ♂ pale ochreous. Forewings oblong, rather narrower in ♂, costa very strongly arched near base, remainder slightly sinuate, apex obtuse, termen slightly sinuate, little oblique; 7 to termen, 8 to costa; rosy-brownish or rosy-fuscous, more or less tinged or suffused with darker violet-fuscous on dorsal half and posteriorly, darkest in ♂; costal edge ferruginous in ♀; a darker brown streak rises from costa at ¼ and runs above cell to its upper angle; a white dot at lower angle of cell: cilia dark ashy-fuscous. Hindwings with 6 and 7 approximated towards base; cilia in ♂ greyish, in ♀ pale ochreous.

COLOMBIA, Naranjito, R. Dagua, at 3,900 feet, in June, 1 ♂; DUTCH GUIANA, Paramaribo, in December, 1 ♀.

Stenoma fluminata, n. sp.

♂ ♀, 18–27 mm. Head white, crown suffused with pale brownish. Palpi white, second joint dark grey except towards apex, terminal joint ⅓, tip blackish. Antennal ciliations of ♂ 3. Thorax pale brownish, shoulders whitish. Abdomen whitish-fuscous. Forewings elongate, rather narrow, costa rather strongly arched towards base, thence nearly straight, apex obtuse, termen slightly rounded, somewhat oblique, 7 to apex; pale brownish, in disc and towards dorsum tinged with yellowish and sprinkled with dark fuscous, towards costa sometimes suffused with whitish; veins more or less marked with suffused dark fuscous lines; an undefined streak of dark fuscous suffusion from base of costa to below middle of disc, sometimes obsolete posteriorly; a dentate dark fuscous or blackish line from ¼ of costa, reaching half across wing; plical and second discal stigmata dark fuscous; an elongate dark fuscous spot on costa before middle, and an irregular attenuated streak extending from middle of costa beneath costa to near apex; a spot of dark fuscous suffusion on dorsum beyond middle; a strongly outwards-curved irregular series of dark fuscous dots from middle of costa to a dorsal spot before tornus; a series of dark fuscous marks round

posterior part of costa and termen : cilia pale ochreous more or less mixed with fuscous. Hindwings with 3 and 4 stalked, 6 and 7 stalked ; pale grey ; cilia whitish, with pale grey subbasal line.

COLOMBIA, San Antonio, 5,800 feet, in November ; DUTCH GUIANA, Paramaribo, in December ; five specimens.

Stenoma orthocapna, n. sp.

♀. 30–31 mm. Head and thorax light lilac-fuscous. Palpi lilac-fuscous, terminal joint $\frac{1}{3}$, whitish. Abdomen fuscous, beneath ochreous-yellowish. Forewings elongate, rather narrow, costa gently arched, apex rounded, termen rounded, hardly oblique, 7 to apex ; rather light glossy lilac-fuscous ; a suffused blackish-fuscous longitudinal median streak from base to apex, second discal stigma appearing as a dark fuscous dot on its lower edge, costal area above this streak somewhat lighter ; faint dorsal spots of darker suffusion beyond middle and before tornus, and a faint curved tranverse line before termen ; indistinct darker dots along termen : cilia brownish. Hindwings and cilia rather dark fuscous ; 6 and 7 stalked.

BRITISH GUIANA, R. Demerara ; two specimens.

HYPONOMEUTIDAE.

Ethmia conglobata, n. sp.

♂ ♀. 27–28 mm. Head and thorax grey, face and sides of crown white. Palpi white, second and terminal joints each with two black bands. Abdomen grey, apex ochreous-yellow. Forewings elongate, posteriorly dilated, costa moderately arched, apex obtuse, termen obliquely rounded ; white, suffusedly mixed with dark fuscous, with about sixteen irregularly placed smaller and larger cloudy dark fuscous spots in disc, the largest and most conspicuous being one beneath middle of disc and an angulated series of four from $\frac{3}{4}$ of costa to dorsum before tornus, beyond which there are no others ; a clear white streak runs round apical portion of costa and termen, with a series of black marginal dots or marks : cilia white. Hindwings without bar between 7 and 8 ; grey, in ♂ paler and whitish-tinged towards base ; cilia whitish, with light grey subbasal line.

COLOMBIA, San Antonio, 5,800 feet, in November ; two specimens.

Ethmia chalcodora, n. sp.

♀. 22 mm. Head white. Palpi whitish. Thorax white, with blackish spot on each shoulder (dorsum defaced). Abdomen dark fuscous, segmental margins white, subbasal segment and anal tuft pale yellow-ochreous. Forewings elongate, rather narrow, costa gently arched, apex obtuse, termen rounded, rather oblique; ochreous-white; markings dark fuscous with leaden-blue reflections; two irregular longitudinal rows of about eight small spots each extending from base through disc to apical blotch; a streak along costa from base to a median blotch, which sometimes absorbs the two spots of upper series beneath it; a semioval blotch on middle of dorsum, enclosing in its upper portion a purple-coppery spot with some white scales; a purple-coppery apical blotch: cilia pale grey, basal third dark purplish-fuscous. Hindwings with oblique bar between angle of cell and vein 8; whitish, thinly scaled; apex suffused with grey; cilia white.

ARGENTINA, La Plata; two specimens.

TINEIDAE.

BRACHYSYMBOLA, n. g.

Head loosely rough-haired; tongue absent. Antennae $\frac{1}{3}$, basal joint moderately elongate, scaled. Labial palpi moderate, subascending, second joint shortly rough-scaled, terminal joint very short, pointed. Maxillary palpi rudimentary. Femora and tibiae all clothed with long fine hairs. Forewings with 2 from towards angle, 7 and 8 separate or stalked, 7 to termen, 11 from much before middle. Hindwings 1, elongate-ovate, cilia $\frac{1}{2}$; all veins separate, 5 and 6 rather approximated, forked parting-vein well defined.

Brachysymbola sepulcralis, n. sp.

♀. 30–32 mm. Head, palpi, thorax, and abdomen white. Forewings elongate, rather narrow, costa slightly arched, apex obtuse-pointed, termen almost straight, oblique; white: cilia white. Hindwings white, sometimes tinged with grey; cilia white. Undersurface of all wings suffused with light grey.

ARGENTINA, Tucuman; two specimens.

XXXI. *New species of* Hawaiian Hymenoptera, *with notes on some previously described.*

By R. C. L. Perkins, D.Sc., M.A., F.E.S.

[Read November 15th, 1911.]

Since the descriptions of the Aculeate Hymenoptera were completed in the "Fauna Hawaiiensis," I have obtained the old collection formed by the Rev. T. Blackburn, wherein are a number of types of species that he described himself, as well as examples of the species that he sent for description to F. Smith and Cameron. The examination of this collection has enabled me to settle a number of doubtful points, and I take the opportunity of describing some new species. The genus *Nesoprosopis*, to which the bees, here described, belong, is very interesting from its strange and excessive development in the Hawaiian group, more than fifty species having been described from this small area. Outside the islands I have, until recently, been acquainted with only one other species of the genus, the European *N. kriechbaumeri*, Först., which, by a rather curious coincidence, since the genus was made by myself for the reception of the Hawaiian species, I happened to be the first to meet with in England. Recently I have received another species of the genus from Mr. J. C. Kershaw, collected by him in China, so that it probably extends right across Europe and Asia, though I suspect the number of species may be limited. I have included a description of the Chinese species in this paper. Should the genus not be found in the New World, one would naturally conclude that the Hawaiian forms were descendants of an ancient Asiatic immigrant. I have found nothing allied to *Nesoprosopis* in the very numerous Australian *Prosopidae* that I have examined. It may also be noted here that I have received *Megachile schauinslandi*, which was introduced into the islands between twenty and thirty years ago, amongst some *Hymenoptera* collected by Mr. Kershaw. Though its appearance was Oriental, we had no previous knowledge that it was found in China.

Odynerus charadrophilus, sp. nov.

Niger, fronte rufonotata, mesopleuris rufomaculatis, propodei lateribus rufis, scutello rufonotata. Abdominis segmentum primum utrinque macula rufa antice bilobata ornatum. Alae infuscatae, caeruleo-iridescentes. Clypeus subtilissime punctatus, apice extremo laevi, deplanato, haud emarginato. Frons dense, nec profunde, grosse punctata, subnitida. Mesonotum subnitidum, fortiter nec remote punctatum, interstitiis sparsissime et perinconspicue punctulatis. Scutellum distincte, sat aequaliter, mesonoto subtilius punctatum. Propodeum remote punctatum. Abdominis segmentum primum minus breve, parte basali, a latere visa, rotundata, haud fere recte verticali, distincte nec dense punctatum. Segmentum secundum dorsale a basi fortius elevatum, obsolete subtiliter punctatum ; ventrale post costas (satis fortes) anguste depressum, depressione male definita. Abdomen supra nitidum.

♀. Long. ad apicem segmenti 2 abdominalis 8 mm.

Hab. Molokai, 3,000 ft.

Obs. Almost exactly resembles *O. petrobius* superficially, and is found in company with that species and *O. microdemas*, but it is not closely allied to these and is a very distinct species.

Odynerus hylophilus, sp. nov.

Niger, opacus, fronte rufonotata, mandibulis et apice clypei rufis, abdominis segmento primo utrinque rufomaculato, secundi dorsalis lateribus rufis, ventralis basi utrinque rufomaculata. Clypeus subtiliter punctatus, apice leviter dentato-emarginato. Frons peropaca, grosse subobsolete. Mesonotum opacum, subgrossim, remote nec profunde punctatum, puncturatione interstitiali vix videnda. Propodeum, a fronte visum, conspicue emarginatum, peropacum, haud vel vix punctatum, lateribus marginatis. Abdominis segmentum primum, a latere visum, fortiter fere aequaliter curvatum, vix nitidum, remotius punctatum. Segmentum secundum dorsale fortiter tuberculatim-elevatum, ventrale post costas distincte sat fortiter impressum, depressione haud perlata. Alae fortiter infuscatae, caerulo-iridescentes.

♂. Long. ad apicem segmenti 2 abdominalis 7 mm.

Hab. Hawaii, in company with *O. rubropustulatus*, *obscurepunctatus* and *crypterythrus*. Most like the latter, but the structural differences are so important that it is very distinct and the alliance doubtful.

Odynerus xerobius, sp. nov.

Niger, mandibulis rufis, alis infuscatis et in parte costali evidenter caeruleo-iridescentibus. Clypeus fortiter emarginatus. Frons capitis subnitida, grossius aequaliter punctata. Mesonotum opacum fere aequaliter punctatum, interstitiis minutissime satis copiose punctulatis, punctulis vix discernendis. Propodeum peropacum, antice obscure rugosum, sive rugosopunctatum, concavitate sat alta transversim subtiliter rugulosa, rugis curvatis. Abdominis segmentum primum grosse, nec profunde, subcrebre punctatum, antice, a latere visum, fere verticale. Segmentum secundum dorsale simpliciter convexum, ventrale post costas fere planum, depressione nulla definita.

♂. Long. ad apicem segmenti 2 abdominalis circiter 7 mm.

Hab. Lanai. I am not at all sure as to the affinities of this rather obscure but distinct species. It may be most closely allied to *O. thersites* of Hawaii, but it is very different.

Nesoprosopis hula, sp. nov.

Mas niger; clypeus macula magna, antice dilatata, flava ornatus, lateribus ad $\frac{2}{3}$ longitudinis basalique margine extremo nigris, macula extra clypeum utrinque plus minus triangularia et ad basim clypei postice extensa, flava. Articulus primus antennarum antice flavo-marginatus, pronoti tuberculis etiam postice flavo-lineatis. Tarsi omnes, tibiae anteriores, macula postica excepta, tibiae intermediae ad basim apicemque, tibiae posteriores ad basim late et ad apicem anguste, flavi vel flavescentes. Alae hyalinae, venis cum stigmate nigrofuscis. Caput, a fronte visum, latum, oculis fortiter convergentibus, genis longitudine mediocribus, laminae supra clypearis margine antico margine laterali (usque ad forsan antennalem) haud longiore, fronte dense subtiliter punctata, plaga pernigra carente. Antennarum articulus primus subtriangularis fortiter dilatatus, evidenter tamen longior quam latior, margine postico fortiter rotundato, antico fere recto, subtus distincte concavus. Caput cum mesonoto pubescentia minus brevi et erecta vestitum. Mesonotum minutissime quasi granulatum, subtilissime obsolete sparsim punctulatum, haud nitidum, propodeo ad marginem anteriorem brevissime longitudinaliter rugosum, caetera parte tantum microscopice sculpturata.

Long. 5 mm.

Femina nigra, pedibus nigris, capite linea tenui flava orbitali utrinque ornato, pronoti margine postico utrinque leviter flavonotato, tibiis anticis antice testaceo-maculatis. Caput latum, genis distinctis,

brevioribus, fronte densissime ruguloso-punctata. Mesonotum peropacum, quasi minutissime granulatum et subtilissime et obsoletissime punctatum, linea mediali laevi ad medium mesonotum extensa, propodeo rugulis perpaucis brevissimis ad marginem anteriorem, vix videndis, sculpturato, caetera parte tantum microscopice sculpturata, quam mesonotum multo minus opaco. Abdomen laeve, haud evidenter punctatum.

Long. 6 mm.

The male of this species in my tables (Fauna Haw. II, 601) would probably be run down to twenty-eight, *N. mauiensis*, which is quite different, having a black clypeus. If, as is quite likely, it sometimes has two small yellow spots on the pronotum, a specimen so marked would run down to *N. kona*, to which it really is allied.

Hab. HAWAII, Kilauea, on *Myoporum*.

Nesoprosopis filicum, sp. nov.

Mas niger, clypeo macula magna flava antice dilatata ornato, marginibus lateralibus et basi nigris, extra clypeum utrinque macula flava orbitali post antennas acute prolongata. Pedes nigricantes, tibiis anterioribus antice flavescentibus. Alae leviter infuscatae, venis nigrofuscis. Angustus, genis brevibus, lamine supraclypeari brevi, sutura apicali quam sutura lateralis longiore. Antennarum articulus primus fortiter dilatatus, longior tamen quam latior, margine postico fortiter rotundato, margine antico fere recto, angulo apicali quasi producto, subtus fortiter arcuatus. Frons capitis densissime punctata, plaga parva mediali nigriore minus distincta. Caput cum mesonoto pubescentia tenui erecta fusca vestitum. Mesonotum peropacum, subtilissime obsoletim punctatum, propodeo sat longo, ad marginem anticam brevissime, inconspicue rugoso, caetera parte densissime microscopice sculpturata, postice nitidula. Abdomen haud evidenter punctatum.

Long. 5 mm.

This species would run to the heading of *N. mauiensis* in my table, and is allied to that species.

Hab. HAWAII, Kilauea, flying round ferns.

Nesoprosopis homoeochroma, sp. nov.

Mas niger, clypeo more *N. hulae* flavonotato, juxta clypeum utrinque macula flava triangularia magna, haud post antennas producta, pronoto postice bilineato, tuberculis etiam flavonotatis. Tibiae anteriores antice cum articulo tarsorum basali flavescentes, caeteris articulis pallide brunneis. Tibiae intermediae et posticae

ad basim minus late flavae, tarsis, excepto basali articulo plus minus flavescenti, fusco-brunneis.

Caput a fronte visum sat breve, laminae supraclypearis sutura anteriore et laterali fere aequilongis, fronte densissime punctata, media parte plaga pernigra, densissime sculpturata, conspicue signata. Antennarum articulus primus fortiter dilatatus, subtriangularis, evidenter longior quam latior, margine posteriori rotundato, anteriori fere recto, supra punctatus, subtus arcuatus. Mesonotum opacum, densissime et minutissime quasi granulatum, subtilissime fere aequaliter nec dense punctatum, pubescentia fusca longiore erecta vestitum, scutello opaco et mesonoto evidenter fortius punctato. Propodeum vix subnitidum, ad marginem anteriorem brevissime longitudinaliter rugosum, caetera parte quasi granulata (sive microscopice reticulata). Abdomen subnitidum, haud aut vix punctatum. Alae hyalinae, venis nigrofuscis.

♂. Long. 4·5 mm.

In my table this species would be included with *N. kona*, *kauaiensis* and *unica*, but it is not allied to any of these, and would be distinguished at once from the former by the colour of the legs and many other characters, from the latter two by the much less wide supraclypeal plate, etc. It is nearest to *N. coniceps*, but apart from colour the process of the eighth ventral segment is less dilated before the apical bifurcation. It cannot be considered as the ♂ of *N. specularis* without good evidence to associate the two.

Hab. Hawaii, Kilauea, with *N. dumetorum*, and looking like a brightly marked example of that species.

Nesoprosopis pele, sp. nov.

Mas niger, colore fere *N. homoeochromi*, sed macula clypeari paullo breviore et minore, maculis lateralibus postice subtruncatis, pronoto tuberculisque haud flavonotatis, tarsis anterioribus parum pallidis, articulo basali ad basim paullo flavescente, alis distincte infuscatis.

Caput, a fronte visum, subrotundatum, lamina supracleari brevi, margine anteriore quam margo lataralis perspicue longiore. Antennae fere *N. homoeochromae* similes. Frontis plaga pernigra medialis multo minus distincta. Mesonotum opacum, sparsius et remotius obsoletim punctatum. Area propodei ad marginem anteriorem brevissime rugosa, post hunc peropaca et densissime sculpturata, ad declivitatum tantum subnitida. Abdomen subnitidum, vix punctatum.

♂. Long. 4·5 mm.

Would run to the heading of *N. mauiensis* in the table, except for the yellow-marked clypeus. Structurally it differs from that species in the structure of the scape of the antennae, etc. I cannot consider it to be the ♂ of *N. specularis*.

Hab. Hawaii: Kilauea.

Formerly I confused it (as well as *N. homoeochromus*) with *N. dumetorum*, but the essential structural characters of the latter as given in my original description are correct.

Nesoprosopis coniceps, Blackburn.

I now possess the types of this species, and the specimens, from which I redescribed it, were rightly identified. In rare varieties the lateral facial spots, adjoining the clypeus, are greatly reduced in size, but I have seen none in which they are altogether wanting.

Nesoprosopis psammobia, sp. nov.

Mas niger, clypeo duabusque maculis lateralibus, postice ad forsas antennales extensis, flavis, clypei suturis lateralibus nigricantibus, tarsis omnibus atris, tibiis anterioribus antice flavomaculatis, lamina supraclypeari saepe flavopunctata.

Caput, a fronte visum, utrinque longitudinaliter impressum, lamina supraclypeari minus elongata, sutura apicali ac satura lateralis fere aeque longa. Frons densissime punctata. Antennarum articulus primus fortiter dilatatus, sed longior quam latior, margine postico fortiter rotundato, margine anteriore fere recto, subtus distincte arcuatus. Mesonotum opacum, dense aequaliter, nec profunde, punctatum, scutello paullo fortius aequaliter punctato. Propodei area antica ubique rugosa et opaca. Abdomen subnitidum, vix punctatum, marginibus apicalibus segmentorum pallescentibus. Processus apicalis segmenti 8 ventralis fortiter curvatus, parum dilatatus, apice bifurcato.

Femina nigra, antennarum flagello subtus ferrugineo, clypei apice transversim flavonotato, duabus lineis orbitalibus, post antennas haud extensis, flavis, tibiis anterioribus antice ferrugineo-maculatis. Nonnunquam caput totum nigrum, notis nullis flavis. Frons capitis distincte nitida, densissime punctata, evidenter pubescens. Mesonotum fere opacum, distincte aequaliter dense punctatum, propodeo longitudinaliter rugoso, a fronte viso, subnitido. Abdomen plus minusve nitidum, fere impunctatum, pilis apicalibus fuscescentibus.

♂ ♀. Long. circiter 6 mm.

This species is difficult to place. I think it belongs to the *blackburni* group, but it shows some affinities with the *facilis* group. In the table it would, if considered as having the process of the eighth ventral segment not dilated, be run down to *anthracina*, to which it is somewhat allied; if the process be considered dilated, of which there is slight indication, it would run to the heading of *N. assimulans*, to which it is still more closely allied. The variation in the colour of the face in the ♀ is very remarkable and unusual.

Hab. HAWAII; a littoral or sublittoral species.

Nesoprosopis chinensis, sp. nov.

Mas niger, capite prae antennis flavo, hoc colore paullo post antennas juxta oculus acute producto, antennarum articulo primo antice flavolineato, flagello, subtus ferrugineo. Pronotum utrinque cum tuberculis et tegulis flavonotatis. Tibiae anteriores supra tarsique flavi; intermediae ad basim cum tarsis flavae, horum articulis apicalibus flavotestaceis; posteriores ad basim late flavae, tarsorum articulo basali flavo, sequentibus testaceis, apicali fusco.

Clypeus haud laevis, dense et parum profunde punctatus, lamina supraclypeari lata, sutura apicali, quam lateralis, permulto longiore. Antennarum articulus primus subdilatatus, circiter bis longior quam latior, subtus distincte arcuatus. Frons capitis densissime punctata. Mesonotum distincte denseque aequaliter punctatum, scutello postscutelloque, quam mesonotum, rugosius punctatis. Propodei area anterior nitida, glabra, rugis transversis compluribus fortissimis ornata, caeteris partibus rugosis, et pubescentia pallida vestitis. Alae hyalinae, venis fuscis, vena subcostali cum stigmate obscuriore. Abdominis segmentum primum pernitidum, remote et subtilissime punctatum, margine apicali latera versus densius pubescente, segmento secundo densius punctato.

Long. circiter 6–7 mm.

Abdominis armatura genitalis angusta, stipitibus angustis, subacutis, parce pilosis, post sagittas (in aspectu dorsali) extensis, segmento 8 ventrali (in aspectu ventrali) longe producto, processu ubique dilatato, suberecto, apice bifurcato et dilatato, et pilis longis vestito.

Hab. CHINA: Macao and West River as far as Kwei-yuen (Kershaw).

The Blackburnian collection of Aculeata, when received by me, was generally in good condition, excepting that the

specimens were in need of cleaning, and some specimens, not of much importance, were in process of destruction from the formation of verdigris.

Odynerus hawaiiensis, Bl. Under this name a number of species were confused. As mentioned in the "Fauna Hawaiiensis," a specimen sent to me by Mr. Blackburn, as representing this species, was a female of *Pseudopterocheilus pterocheiloides*, and I suggested that *O. hawaiiensis* might really be my *O. erythrognathus*. As a matter of fact, five of the twelve examples are *erythrognathus*. The individual, however, which bears the type label, is unfortunately the very distinct *O. venator*, and as this individual is specially referred to in the original description as being a *variety*, it seems doubtful whether it can be accepted as the type of the species. If the name "hawaiiensis" be accepted at all, it should, I think, sink my species *O. erythrognathus* rather than *O. venator*, in spite of the type label. On the other hand, the description of *O. hawaiiensis* was made from a series of such different species that one may well doubt whether it ought not to be disregarded. Thus five specimens, as above mentioned, are my *Odynerus erythrognathus*, one, the type, is *O. venator*, one is *O. thersites*, three are *Pseudopterocheilus pterocheiloides*, one is *Chelodynerus chelifer*, and one is *Nesodynerus eyens*. The confusion of species is due to the fact that Mr. Blackburn followed Smith in his system of description of the Hawaiian Hymenoptera, and paid no attention to the mouth parts, mandibles, second abdominal ventral segment, and the tibial spurs.

Odynerus vulcanus, Bl. The examples referred to as varieties are *O. konanus*, P.

O. haleakalae, Bl. This, or rather the type, is, as I suggested, my *O. ecostatus*, but it also included one *O. lanaiensis*, P., and one *O. laevisulcatus*, P.

O. agilis, Smith. Now known as *O. smithii*, D.T., the name *agilis* having previously been used by Smith in the genus. The Blackburnian series consists of *O. smithii* 4, *O. socialibus* many, *O. scoriaceus* 2, *O. peles* 1.

O. dubiosus, Sm. The types are as identified by me, but Blackburn's specimens included *O. pterophaennes*, P.

O. insulicola, Bl. The series contained one *Nesodynerus cooki*, P., or a form representing that species on Maui.

O. kirbyi, D.T. (=*O. extraneus*, Kirby) is represented by one *O. kauaiensis*, P., only.

O. localis, Sm., is represented by one *O. radula*, Fab., only.

Crabro adspectans, Bl., is my *Nesocrabro daemonius*, which becomes a synonym.

Crabro mauiensis, Bl., is a yellow-spotted ♀ of *Crabro mandibularis*, Sm.

The female *Crabro* suggested as belonging to the ♂ of *C. abnormis*, Bl., is the ♀ of my *Hylocrabro tumidoventris*, the ♂ of which occurred in the series of *Xenocrabro unicolor*, Sm.

The Blackburnian specimens of *Mimesa antennata*, as named by Smith, were a closely allied species, my *Nesomimesa nitida*.

Nesoprosopis facilis, Sm., on which Blackburn published some remarks, included also *N. koae*, P., from Oahu, and *N. difficilis* from Hawaii.

A long series of *N. blackburni*, Sm., of which I have seen the types, contained only one true *blackburni*, most of the specimens being *N. longiceps*, P., with *N. obscurata*, P., from Hawaii.

It is proper to remark that in *Odynerus* the characters of the second ventral segment being at the time the Hawaiian insects were described hardly ever utilised by hymenopterists, and the concealed male terminal segments of *Prosopis* not at all, the confusion of species is not at all to be wondered at.

O. conifer, P., subsequently referred by me to the genus *Nesodynerus*, was wrongly so referred. The specimen that I examined was an old one, and no doubt had the calcaria broken. They are present in the type.

Pison argentatum, Sh. This is a recent introduction into the Hawaiian islands, and the species was kindly determined for me by Mr. R. E. Turner. It was described from Mauritius, and is also recorded from Singapore and Borneo. I have no doubt it will be found to occur in China or Japan, and was thence introduced into Honolulu.

XXXII. *Notes on* Hawaiian Hemiptera, *with descriptions of new species.* By R. C. L. Perkins, D.Sc., M.A., F.E.S.

[Read November 15th, 1911.]

NABIDAE.

Reduviolus, Kirby.

In September 1909 Kirkaldy published a revision of the Hawaiian species of *Reduviolus*, this being his final one of several papers on the subject, each of these several papers giving very different conclusions. I have had occasion to make some study of the Hawaiian species at different times, both when naming my own specimens, and later when it became necessary for me to straighten out the Hawaiian collection, entrusted to Kirkaldy by the Sandwich Island Committee. This latter collection, owing to his sad and unexpected death, was left in great confusion and required much work before it could be arranged and the types determined, and for the same reason the proofs of his last contribution to the "Fauna Hawaiiensis" were unrevised. Having in my own possession the Blackburnian collection of Hawaiian Hemiptera, I have been able to compare specimens of the species described by Blackburn and White with those more lately collected.

Kirkaldy's revision, above mentioned, was published in the Proc. Haw. Ent. Soc. II, p. 49 et seq. His work on the genus contained in the "Fauna Hawaiiensis," II, p. 546 et seq., was written before this revision, but was not published till December 1910, or after his death. Consequently a number of the species given in the "Fauna Hawaiiensis" are sunk in the revision published earlier. There are also in the latter a number of serious and almost inexplicable errors connected with the sex of the insects therein described. Thus of *R. nubigenus* it is said, "I have no males now before me," but the actual type which Kirkaldy was using was a ♂; of *R. nubicola*, "of this I have not seen a male," but the type is a ♂; of *R. procellaris*, "male yellowish-brown," but the unique type is a ♀.

R. oscillans is sunk under *subrufus*, but the two are distinct, and I suspect that the examples called *koelensis* by Kirkaldy are pale examples of *subrufus*. *R. subrufus*,

Kirkaldy = *R. oscillans*, Blackburn. For the species, which he originally called *R. rubritinctus* (having quite overlooked the head spines), he subsequently made a subgenus *Milu*, calling the species *R. kerasphoros*. *R. rubritinctus*, Blackburn, is quite distinct from this, the basal antennal joint being much less incrassate, and there are no head spines. Blackburn did not collect *R. kerasphoros*, though it is not rare close to Honolulu. The unique type of *R. koelensis*, Bl., is much damaged, but is evidently extremely like *R. subrufus* (= ? *koelensis*, Kirk.), and probably only a variety of this. *Reduviolus montivagus*, Kirk., afterwards considered to be a variety of *R. tarai*, is, I think, certainly not that species, but is probably the ♂ of *R. sharpianus*. Kirkaldy says that he has not seen a male of *montivagus*, but the unique type is a ♂. *R. volcanicola*, Kirk., is a synonym of *R. curtipennis*, Bl., the type of which I possess.

CAPSIDAE.

Cyrtopeltis confusa, sp. nov.

Entirely pale, flavescent, or sometimes more or less greenish tinged, in dark varieties with the clavus, apex of corium and of the cuneus infuscate, as also more or less of the basal antennal joint, and the pronotum may be mottled with fuscous. Head and pronotum with very sparse hairs, the head smooth and shining. Antennae long and slender, if laid back they would reach to or nearly to the apex of the tegmina, basal joint elongate, about four times as long as wide, second and third about equal and very slender, the fourth only about half as long as the second. Pronotum appearing elongate, being much narrowed in front, about twice as wide at the base as on its front margin, about as long as its width at the middle, its front lobe rather strongly convex, clothed with short pale pubescence like the tegmina, its hind margin strongly emarginate. Legs very long and slender, the hind femora with short pubescence and a row of fine, widely separated, bristles above, the tibiae pubescent and with longish pale bristles. Hind tibiae nearly three times as long as the tarsi.

Length 3·5–4 mm.

♂ with the terminal ventral segment very asymmetrical, produced on one side into a long process, dilated at the apex. On its inner side dorsally this production of the segment gives off a slender process, which is very strongly bent. Fig. A shows the outline of this segment in ventral aspect and the process subdorsally.

Hab. Oahu, common in all stages on *Gouldia* in the mountains.

Obs. This is the species referred to by Kirkaldy in his supplement to the Hemiptera, "Fauna Haw.," II, p. 553, as *Cyrtopeltis hawaiiensis*, but it clearly has nothing to do with that species, described in the same work, p. 138. The original series of *C. hawaiiensis*, excepting the type set, was destroyed during one of Mr. Kirkaldy's illnesses in hospital for want of attention. There was therefore no reason to assume, without comparison of specimens, that his original description of *Cyrtopeltis* was erroneous. I have an example from near the Waianae coast of Oahu, which agrees exactly with Kirkaldy's description of *C. hawaiiensis*, but is rather smaller. I should think *C. confusa* is decidedly not even congeneric with *C. hawaiiensis*, the very different antennae and pronotum, the larger and more coarsely faceted eyes and many other distinctions separating the two. At present, however, it is only necessary to call attention to the existing confusion of species with entirely different habits and appearance, especially as *C. confusa* is one of the most familiar endemic Hemiptera of the Honolulu district. *C. hawaiiensis* will probably be found on *Dodonaea viscosa*, which grows freely both above and below the true forest belt.

Tichorhinus tantali, sp. nov.

Colour in well-preserved dry specimens after four or five years preservation as follows: head, pronotum anteriorly, scutellum and legs yellow, sometimes more or less greenish tinged, pronotum

posteriorly and tegmina green; clavus for the most part blackish, membrane smoky black, with a clear area adjoining and extending behind the cuneus. Second and following joints of the antennae dark, the second sometimes yellow except at the apex. Basal joint of antennae about three times as long as wide; second about $1\frac{3}{4}$ the length of the third, fourth about $\frac{3}{4}$ as long as the latter. Eyes nearly similar in the sexes. Head, thorax and tegmina with pale pubescence. Bristles of the hind tibiae pale, the tarsi more or less dark.

Length 2·2 to about 3 mm.

♂ with the right and left clasper very unlike, the one wide and blunt at the apex with a tuft or area of very long hairs towards the base, the other narrow and elongate, somewhat twisted, with a chitinous hook at the apex, preceded by a sharp angle; hairs near the base much shorter than on the other clasper (Fig. B).

This small and delicate species resembles some varieties *T. kanakanus*, but it is much smaller, very little variable and quite distinct structurally. Owing to the variability of some of the Hawaiian *Tichorhinus* the number of species is quite uncertain, and probably will remain so until the claspers and other male characters are thoroughly investigated.

Hab. Oahu, one of the commonest insects on Mt. Tantalus, near Honolulu, on the leaves of the Urticaceous tree *Pipturus*. It is also found in widely separated localities on the island.

Tichorhinus kirkaldyi, sp. nov.

Colour almost as in typical *T. kekele*, Kirk., but much smaller and easily distinguished structurally by the short basal joint of the antennae, which is only about twice as long as wide. Tegmina seen from in front or from the side with black hairs and no appressed golden pubescence. Hairs of the head and pronotum and the bristles of the hind tibiae black. Membrane smoky, with a white spot adjoining the cuneus. Hind tibiae hardly four times as long as the tarsi. The second joint of the antennae is much wider in proportion to its length than that of *O. kekele*.

Length about 2·5 mm.

Hab. Hawaii, Kilauea; found on *Cyathodes*.

LYGAEIDAE.

Nysius nitidus, F. B.-W.

Blackburn's specimens are from Lanai and Maui, and some, if not all, of them are clearly identical with *N. saundersianus*, Kirkaldy. Unless, therefore, the actual type proves to be different from these, *saundersianus* becomes a synonym. *N. nitidus* is a common insect, often swarming in all stages on the Urticaceous tree, *Urera*, but it is not confined to it. It is known from all the islands, excepting Kauai.

Nysius maniensis, Bl.

This is the only type in Blackburn's collection of *Nysius* that is in bad condition and in a fragmentary state, and it is one of the few previously described species that Kirkaldy identified (I believe, correctly) from the description. It is known from Hawaii and Lanai, as well as Maui.

Nysius arboricola, F. B.-W.

A very variable species, common throughout the mountains of Oahu, usually frequenting the branches of trees, living or dead. The variation affects not only the colour, but also the form and sculpture of the insect. It is the type of Kirkaldy's subgenus *Oceanides*, and his specific name *nimbatus* becomes a synonym.

Nysius rubescens, F. B.-W.

I have only taken this at Kilauea, Hawaii. It was left unnamed by Kirkaldy, who had specimens from that locality. The upper angle of the metapleura is very little prominent, so that the emargination is slight. The hind femora are pale, with inconspicuous or little spotting.

Nysius dallasi, F. B.-W.

A pale stramineous species, with a conspicuous longitudinal black band on each side of the head, bordering the eyes, and the prothoracic callosities also black; femora rather sparsely and inconspicuously spotted; metapleura distinctly emarginate, but the upper angle is not very strongly produced backwards. Superficially it is most like a pallid *N. delectus*.

Nysius longicollis, Bl.

A pale, dull, and pubescent species, with black longitudinal bands along the inner orbits and a rather wide transverse band across the pronotum, produced backwards in the middle as a median longitudinal band, not reaching the hind margin ; two dark lines on the corium, starting about the middle of its length and almost appearing as a single elongate mark, unless the wings are spread, and running into a dark line along the apical margin, the membrane smoky, divided by pale longitudinal lines, two middle areas being darker than the others ; femora very conspicuously black-spotted, both inwardly and outwardly ; metapleura slightly concave, the upper angle rounded and very prominent.

Known to me only by the unique type, but on Maui is a closely allied species or local form. Probably a sublittoral, or at least not a forest insect.

Nysius whitei, F. B.-W.

A more or less testaceous or yellowish-brown species, shining and glabrous, with a median yellow line on the head, the pronotal callosities not dark; metapleura quite strongly emarginate, the upper angle being strongly produced. There is a median dark spot formed along the line of union of the clavi, three along the apical margin of each corium and one at the base of the membrane, adjoining the middle one of the three corial spots. Front and middle legs clear yellowish, hind femora with a dark band beyond the middle.

The single specimen in Blackburn's collection is from Hawaii.

Nysius delectus, F. B.-W.

This is not the *N. delectus* of Kirkaldy, that very common insect being left unnamed in Blackburn's collection or labelled *N. delectus?* N. No. 100, N. No. 71, etc. True *delectus* is distinguished by the darker antennae, the much more strikingly marked femora, the widely black apices of the hind tibiae, etc. The specimens are all from Oahu, and I have only seen those collected by Mr. Blackburn. The *N. delectus* of Kirkaldy is ubiquitous in the islands.

Nysius blackburni, F. B.-W.

This is *N. lichenicola*, Kirkaldy, a species common on Maui and Hawaii, and very variable in colour.

Nysius vulcan, F. B.-W.

This is common at Kilauea, Hawaii, and specimens from this locality and considered (probably rightly) by Kirkaldy as identical with others from Lanai and Molokai, which he described as *N. montivagus*, are clearly *N. vulcan*. The actual type of *N. montivagus* is from Lanai.

N. pteridicola, F. B.-W.

This distinct species is the one described as new by Kirkaldy under the name *N. insulivagus*.

N. coenosulus, St.

Buchanan-White and Kirkaldy identified the same species under this name, but the latter had mixed therewith some quite different species, including *N. nemorivagus*, F. B.-W.

N. nemorivagus, F. B.-W.

This is a very distinct species, the dark antennae, the pale mottled tegmina and conspicuously black-spotted femora being evident superficial characters. The metapleura are very little emarginate in some examples, more so in others. It occurs at Kilauea, and was apparently considered a variety of *N. coenosulus* by Kirkaldy.

N. kamehameha, Kirk.

This appears to me to be very close to the true *N. delectus*, F. B.-W.

N. ochriasis, Kirk.

Usually found in the native composite plants, *Raillardia*.

N. oribasus, Kirk.

Probably a dark variety of the very variable *N. arboricola*, F. B.-W.

N. oresitrophus, Kirk.

The unique type has evidently been placed in a damp jar for relaxation until the gum has spread over the whole surface. Until cleaned it is in no condition for being described. The description will probably be found incorrect.

N. monticola, Kirk.

I have a specimen of the other sex from Haleakala, Maui. The rostrum appears rather shorter, but it is clearly the same species.

N. nubicola, Kirk.

The rostrum reaches behind the hind coxae in this species, and far behind the coxae in *N. pteridicola*. *N. nubicola* is the No. 120 of the Blackburnian collection, but was never described.

N. hylaeus, Kirk.

Described from Kauai, occurs also as a variety with the dark markings less developed on Oahu.

Nysius haleakalae, sp. nov.

Glabrous, smooth and shining, the rostrum shortish (if laid back probably reaching about to the hind coxae), hind margin of metapleura hardly concave, the upper angle almost a rectangle. Allied to *Nysius whitei*. Colour brownish-yellow, the head especially and part of the corium suffused with red. Hind lobe of the pronotum, except the hind margin, and much of the clavus and corium dark brown or infuscate; membrane with median conspicuous dark longitudinal band of infuscation. Front and middle legs wholly pale, yellow; the hind femora dark on more than the apical half, excepting the pale apex itself, their base as well as the tibiae and tarsi pale. Antennae yellow, a small spot at the base of the 2nd and 3rd joints dark. Head very smooth and shining, without rugulosity. Pronotum with a transverse row of punctures behind the front margin, another row behind the callosities, behind this very sparsely and subobsoletely punctate; scutellum pale, with dark punctures along each side. Tegmina smooth and shining. Abdomen beneath black, except the red apex and lateral margins.

♂. Length 4·5 mm.

Distinguished from *N. whitei* by the more widely banded hind femora, less emarginate metapleura, smoother head, etc.

Hab. Maui, Haleakala, below 2,000 ft.

Nysius hiloensis, sp. nov.

Flavescent, shining, the head black; the head and pronotum with very delicate pubescence, hardly noticeable except on the black

head, where its golden colour renders it more evident. Antennae pale, scape near the tip and extreme base of the following joints with a small dark spot. Clypeus, a line adjoining it on each side, and one surrounding each eye, yellow. Pronotum flavescent, the callosities rather browner, the hind angles with a dark spot and sometimes a median one between these; scutellum more or less brownish-suffused, dark only in the extreme front; tegmina, with the corium and clavus, generally more sordid than the pronotum, but the former quite pale along the costal margin, at the apex of which is a dark spot; membrane with a conspicuous large smoky-black apical median spot, and a round one near the corium. Owing to the transparency of the membrane, when the tegmina are closed two round spots are naturally seen, one belonging to each membrane, followed by a large apical wedge-shaped mark. Legs yellow, the hind femora generally feebly and sparsely spotted with fuscous.

Rostrum short, reaching to the metasternum, the metapleura conspicuously emarginate behind, the upper angle acutely produced. Head dull, very minutely rugulose or subgranulate; pronotum shining, moderately closely punctured, the callosities, a narrow median line, and the extreme hind margin impunctate.

♂. Length 3–4·5 mm.

Hab. Hawaii, Hilo, about 1,200 ft.

Nysius comitans, sp. nov.

General appearance and colour almost identical with that of *N. hiloensis*, but it differs as follows: the head is reddish or brownish, sometimes infuscate in front and with a very distinct median longitudinal pale yellow line, which, however, does not form a percurrent stripe with the clypeus; all the femora bear conspicuous black dots, the infuscate pattern of the membrane is generally much fainter, the meso- and metapleura are reddish or reddish-brown (in *hiloensis* they vary in colour but are partly or sometimes nearly wholly black). Metapleura conspicuously emarginate behind, as in *hiloensis*, but the rostrum is long and reaches well behind the posterior coxae; sculpture and clothing as in *N. hiloensis*.

♂ ♀. Length 4–4·5 mm.

Hab. Hawaii, Hilo, about 1,200 ft.

Nysius delectulus, sp. nov.

This name may be used for the extremely abundant insect called *N. delectus* by Kirkaldy. It is very like that species, but may easily be distinguished by red or pale second and third antennal joints, which are either all black above in *delectus* or at least widely dark at

the base. The femora are more or less conspicuously spotted, but less so than in *delectus*, in which on the upper side of all the femora the black spots often unite to form a continuous line and the apices of the tibiae are much more black.

This species varies much in size and in the colour of the head. In some examples there is only a narrow longitudinal median pale line on this part, in others the whole of the middle of the head in front is widely red.

N. delectulus is the Nysius 101 from Hawaii and 71 from Maui of the Blackburnian collection. Specimens from Oahu are wrongly named *N. coenosulus*.

Hab. All the islands from sea level to high elevations in the mountains.

Nysius sublittoralis, sp. nov.

Rufescent, dull, covered with whitish fine appressed pubescence, a longitudinal stripe along each side of the head, the region of the callosities, forming a band across the pronotum, one or more areas on the scutellum, black or dark-coloured ; clypeus white, or whitish. Tegmina with the widely explanate costal margins of the corium conspicuously white in fresh examples, all the rest of the corium and the clavus appearing comparatively sordid, in old examples yellow, a conspicuous dark longitudinal stripe down the middle of the corium and generally a dark line on each side of this, each about equidistant from it and subparallel, apical angle without a dark spot ; membrane white with two dark longitudinal stripes, and sometimes a third. Legs of an obscure reddish colour, the femora with only very inconspicuous darker dots, or without any.

A very narrow, elongate species, the rostrum reaching only to the base of the hind coxae, the metapleura with the hind margin truncate or nearly so. Pronotum very long, the punctures rather fine and dense and much more even than in most of the other species. Head with only some fine punctures, not at all rugulose, but the sculpture is in fresh examples concealed beneath the tomentose clothing and that of the pronotum appears more sparse than is really the case.

Length ♂ ♀, 4–5·5 mm.

This species appears to resemble *N. longicollis* more closely than any other species, but it is very distinct by the more widely explanate costal margins of the tegmina, the unspotted or faintly marked femora, etc. Blackburn took specimens on Maui (*Nysius* No. 72).

Hab. Oahu, Maui, on the lowlands ; Hawaii in the higher fields of sugar cane.

XXXIII. *On the* nictitans *group of the Genus* Hydroecia, *Gn.*

By the Rev. C. R. N. Burrows, F.E.S.

[Read December 6th, 1911.]

Plates LI–LVIII.

It will be remembered that Mr. Tutt delivered a short address upon the "Separation of British Species of *Hydroecia*" before this Society on March 16th, 1910. The address was illustrated by drawings of the four different forms of genitalia in both sexes, which Mr. Pierce and I had detected in the insects which had been included by most Lepidopterists under the name of *Hydroecia nictitans*. It was with great pleasure that I listened to Mr. Tutt, as I felt that it was only right that he, who had twenty years before suggested the specific distinctness of *H. paludis* and *H. lucens*, should make the announcement that this distinctness had been clearly proved. Unfortunately, it was not at that time possible to publish the illustrations which are so necessary to elucidate the points of difference between insects which resemble one another so closely, and it was understood that later on Mr. Tutt would put the matter more definitely before the Society. He had taken up the matter whole-heartedly, was engaged in examining the points himself, and supervising the execution of the necessary illustrations, when his last illness overtook him, and the matter had to be shelved.

It is under these circumstances that I have been urged to carry out what Mr. Tutt planned, and I ask indulgence if I seem to fall short of the lucidity which that lamented entomologist could command.

In the "Entomologist" for 1888, p. 307, I find what I believe to be the first public intimation of Mr. Tutt's dissatisfaction with the specific identity of the various forms then accepted as *H. nictitans*. He there treats the form which he names *paludis* as a local race, or variety, of *nictitans*. *Lucens*, which had been introduced as a separate species by Freyer and accepted by Herrich-Schaeffer as such, he recognises as "really *nictitans*, and not distinct."

When he published his work on "The Variation of the British Noctuidae," British entomologists were still content to recognise as one single species all the various forms which they called *H. nictitans*. He, in the first volume (1891), tentatively suggested that under this name we had really two, if not three, different species: and actually separated the forms *paludis*, Tutt, and *lucens*, Frr., as sub-species, from *nictitans*, L.

In 1895 ("Entom. Record," vol. vii, p. 78), he published an article, nominally by T. Acton, but actually by himself, under the title, "Varieties of Noctuidae at Warrington," in which he deals again with these puzzling forms, and states that further information supported what he had written and to a large extent had emphasised the distinctness of *nictitans*, *paludis*, and *lucens*.

Dr. J. B. Smith in 1899–1900 published his paper dealing with the North American *Hydroecias*,* and figured the "clasps" ("valves") of thirty-six species, thirty-five American, and one which he calls *nictitans*. The figure is not of *nictitans*, but probably *lucens*, or possibly *paludis*. He writes of *nictitans*, but does not give the faintest indication that he has heard that Tutt had already stated his conviction, that European *nictitans* could be differentiated into three probable species. Nor is an American, who might be excused, the only writer who has appeared ignorant of what has been done and suggested by Tutt in this investigation. Dr. Smith says of the American species, "These species, which have in the past been considered as identical with European *nictitans*, agree in trigonate, pointed primaries, which are in general a shade of brick-red, and in which the outer margin is even. In general maculation all are alike, having all the usual lines and spots, and none of them strongly contrasting. The lines are a deeper shade of red-brown, and the transverse posterior line is geminate, the inner portion crenulate or lunate, the outer even. The ordinary spots may be yellow, white or concolorous, within the limits of the same species, but there are no other white shadings. In the common Eastern species there is no one prominent feature, and the secondaries are reddish or smoky. This, from its general

* Contributions towards a monograph of the Noctuidae of Boreal North America. Revision of the Hydroecia, Gn., by J. B. Smith. Transactions of the American Entomological Society, vol. xxvi, 1899–1900.

locality, I have called *atlantica*, but as a matter of fact it extends to the Rocky Mountains in Colorado. This is the species which most resembles the European *nictitans*, but the sexual pieces of the male differ completely. *Pacifica* is so called from the fact that all the examples seen by me come from the Western Coast States. *Interoceanica* occurs so far only in the region about Winnipeg. These three species I would hardly have dared to separate from *nictitans*, had it not been for the differences in structure in the male genitalia, but these are so radical that specific identity is out of the question." Dr Smith's *atlantica* is identical with *americana*, Speyer (1875).

It is to be supposed that the figures of the "clasps" of these species given by Dr. Smith are more accurate than that of the supposed *nictitans*, but in any case, and even if allowance be made for great inaccuracies, it is evident that not one of these three species is identical with any of our four British representatives of the group.

I may here, perhaps, without presumption, utter a word of warning to students of Dr. Smith's works upon the genitalia. I have not come across his "definitions of terms," if such exist, but he appears to have transposed the terms "harpe" and "clasper," as used by previous writers, and it were well that his example should not be followed, as it causes confusion in an already confused field.

In 1902 ("Entom. Record," vol. xiv, pp. 116–117), Tutt gives a list of "Species and Forms of Lepidoptera, so far only recorded from the British Isles." Here he says of *paludis*, "a quite distinct species, but closely allied to *H. nictitans*," but he does not mention *lucens*, that insect being recognised on the Continent. My opportunity of investigation of Continental lepidoptera is strictly limited, but it is perhaps suggestive that of forty-four European and Asiatic *Hydroecias* belonging to this group now before me, there are several specimens which agree in appearance and in genitalia with *lucens*, but not one which I dare to name *paludis*.

It appears to have been at this point that I became interested in the study of the group. *Nictitans* and *paludis* being both common in my garden at Mucking, I desired to possess a series of *lucens* also. My friends responded according to their power, amongst them Mr. A. W. Bacot, who had been, with Mr. J. A. Simes, spending

an autumn holiday in 1899 collecting upon and around the Crinan Canal. The specimens were placed in my cabinet and there rested for a time. Puzzled about the curious resemblance between the three series, I appealed to Mr. Tutt, who could give me his convictions, but no certainties. I appealed to Mr. F. N. Pierce, already widely known for his unceasing investigations, and found that he had only *nictitans* and had come to the conclusion that there was but one species after all. We vigorously attacked the problem from this new standpoint, and, using Mr. Bacot's material, I was surprised to find that I had stumbled upon a development of genitalia entirely different to *nictitans*, *paludis* and *lucens*. My discovery was announced in the "Entomologist's Record," vol. xx, p. 146 (1908); the insects were exhibited before the City of London Entomological Society, March 17th and May 22nd, and before the South London Entomological Society on April 13th of the same year. After due consideration the new insect was named *Hydroecia crinanensis* (after the locality in which it was first detected) in the "Entom. Record," vol. xx, p. 184.

I give the following description of the specimen I have selected as type; previous descriptions having been only comparative with the other species of the group.

♂. *Hydroecia crinanensis*, Burrows. Larger than *H. nictitans*. F.-w. slightly pointed at the apex, bright red-brown, longitudinal and transverse lines very distinct, fringes concolorous. Orbicular stigma, lighter than the ground-colour. Reniform stigma orange, full, fairly straight edged inwardly, lower lobe projecting outwardly, interior dividing lines faint. H.-w. red-brown, darker towards the outer margin; fringes yellow, the yellow colour intruding in dots upon the darker margin.

Type specimen taken by Mr. A. W. Bacot at Crinan Canal, September 1899.

In the same magazine, vol. xxii (1910), p. 80, is published an article by myself, describing and naming nine distinct forms.

Later, in the last-mentioned magazine, vol. xxii, p. 54 (1910), Mr. Tutt reviewed the position and unreservedly accepted our conclusions. This acceptance he kindly emphasised by his address before this Society before referred to.

This appears to have been Mr. Tutt's last word upon

the subject, and I am left with our preparations and specimens, Mr. Pierce's photographs, and the drawings which were so skilfully executed under Mr. Tutt's eye by Mr. Gatter, who has kindly sent them on to me.

In dealing with our material, Mr. Pierce and I found ourselves faced at the outset by a great difficulty. The likeness of these four species to one another is so extreme that although long series have been exhibited privately to experts, and publicly to most of the London, and some of the Provincial societies, no one has yet been able to point out a single feature by which they can be visually separated with certainty.

In size the imago of *nictitans* is perhaps the smaller. *Crinanensis* is a little larger, *paludis* from a little to considerably larger, and *lucens* generally much larger.

The colour of the fore-wings is as confusing as is the size. *Paludis* is usually of a dull yellow-brown, and by colour alone can generally be separated from the others. I have no specimen of the other three species quite this colour, they being always tinged with red, but both *nictitans* and *lucens* occasionally come very near to it. I have all four species quite red, but when *paludis* is red it remains still quite a different insect from *lucens* in appearance. *Crinanensis* is commonly very dark, sometimes almost melanic, but I have *nictitans* (from Scotland) almost as dark, and also *paludis* from my own garden. There is a tendency to the formation of a central dark band on the fore-wings in the lighter specimens, less common in *nictitans* but common in the rest. In shape of fore-wings all four species agree, the pointed apex being perhaps less marked in *nictitans* and *crinanensis*. In wing markings, also, all are alike—I should perhaps say, more correctly, that there is no one mark belonging to one species which is not to be found upon the others of the group. The orbicular stigma, for instance, is more generally distinct in *nictitans*, it is rarely distinct in *paludis*, often distinct in *lucens*, and frequently so in *crinanensis*. The reniform stigma is always full (that is to say, possesses the inner circumference toward the base of the wing) in *nictitans*, in *crinanensis* it is often almost full, in *lucens* and *paludis* it is never full. But all four forms have frequently the reniform stigma suffused, smudged, or ill-defined, owing to the absence of the fine interior lines. The same resemblance also appears in the colour of the stigmata, which

in all species may be white, orange, or concolorous. The inferior wings of the males are less dark than those of the females, and there is sometimes in all species a thin light band parallel to the hind margin.* When, however, we came to consider the localities from which our specimens came, we appeared to be on firmer ground, although this also may be more or less deceptive, as the species may, and probably do overlap, as do *nictitans* and *paludis* in my garden. It appears, however, that *nictitans* is by far the most generally distributed. I have myself taken it in most localities in which I have collected during its season of flight, and I have received it from all parts of England, Scotland, Ireland and Wales. It appears also to be common on the Continent, and Asia.

Although the discrimination of the three species from *nictitans* is so difficult (apart from the appendages) that one cannot frame a description that will certainly enable any one else to distinguish them, and many find it difficult to believe that they really are distinct, it may be noted that Tutt distinguished the three British species with which he was acquainted long before the genitalia were examined, and would doubtless have distinguished the fourth (*crinanensis*) had he had it before him at the same time. But the marvellous critical instinct which Tutt had in such matters is very rare. Dr. Smith also can apparently easily distinguish from each other the three American species he describes, but without the assistance given by the appendages would have hesitated to regard their differences as of specific value.

Paludis is essentially a salt marsh and riverside species in the south of England. I cannot speak positively, but I believe it to be confined to the south, the specimens mentioned in Mr. Acton's paper, referred to above, being probably not this species at all. I have not, so far as I have been able to judge, received it from any locality out of England.

Lucens is essentially a "moss" species, and I should expect it to be confined to the north of England, Ireland, and perhaps Wales, and to Scotland, in its chosen haunts. It appears also to occur in Europe and Asia, if my more or less hasty examination of my material is to be trusted.

Crinanensis is a stream-side insect. Wherever it has

* The number of specimens here described is *H. nictitans* 40 *H. paludis* 33, *H. lucens* 27, *H. crinanensis* 46, being my own series

been taken, so far as I have been able to learn, its haunts are by running water irrespective of elevation, or of the neighbourhood of the sea.

Mr. J. G. Le Marchant, who found it in plenty near Aberfeldy, N.B., writes me thus: "There is a strip of marshy, boggy ground some two or three hundred yards wide, along the side of the river, and some three or four miles long. It is covered with coarse grasses, rushes, and a good many flowers, notably "scabious." There are also knapweed, hawkweed, and other flowers. It is along this strip that I have taken all the insects I send to you; there do not seem to be any on the slopes of the hills even close by. On the "Knowie," surrounded by rushes, they are very numerous when the sun is shining, sitting *always* on the scabious blossoms, sometimes three or four on a plant."

Mr. Buxton * at Liddelbank, N.B., and Mr. Sweeting on Loch Foyle, also noticed the predilection of this insect for the scabious, which may indeed prove to be its food plant.

With *crinanensis* I have received a few *nictitans* and *lucens*, but I believe where it occurs this insect is found almost always alone.

The localities which I have recorded for this species are Inveran (Sutherlandshire), Maddison collection; Bellanoch, Crinan Canal, Messrs. Bacot and Simes; Aberfeldy, Le Marchant; Liddelbank, Messrs. Buxton; near Loch Foyle, H. R. Sweeting; near Enniskillen, in Co. Monaghan, and Bolton, Lancs., J. E. R. Allen.

All these insects appear in Britain at the end of August and beginning of September.

Mr. Pierce and I had perforce, in the first instance, to differentiate our insects by locality. No difficulty arose as to finding the proper females of the species affecting my garden. Having separated the males of *lucens* from *nictitans*, we recognised the female of this insect by her difference from the other insect. Proceeding, we found the female of *crinanensis* by her difference from that of *lucens* and *nictitans*. We may, I feel, claim that our conclusions are fairly likely to be correct, though we admit that further examination, while it cannot well lessen the number of the species now under consideration, may possibly increase it.

* Mr. Buxton writes me that it was more often on thistle blossom.

We turned next to the genitalia. As will be readily seen by the plates which accompany this paper, these organs in the four species—and in *H. americana*, Spr. (*atlantica*, Smith), the common North American species belonging to the same group—are closely related in general configuration, although the details are different. It is these differences that I would now point out.

First considering the males.

Taking our commonest species, *H. nictitans*, we find that the claspers (valves) are tipped with a more or less rounded head (cucullus). There are no external free angles; there are spines along the outer margin for about half its length (corona), and a bunch of spines upon the rounded, not pointed, anal angle. The "harpe" is boot-shaped, the stout inner and outer branches being of equal length. The clavus is claw-shaped, curved towards the centre, and is clothed with hair. The "vesica" is armed with a bunch of long thin "cornuti." These vary in number between about four and eight; and also in length, but I have never observed any of these in this, or the other species, within the "bursa copulatrix" of the female.

In *H. paludis* there is a marked difference in the form of the "cucullus," which is larger, and distinctly angulated. The "corona" extends nearly three-quarters of the distance along the margin, the anal angle is obtusely pointed, and bears a large bunch of spines. The "harpe" is boot-shaped, but has a long toe and a short heel. The "clavus" is long and pointed at the end. The "cornuti" are short and stout, being some nine to twelve in number.

H. lucens has the "cucullus" much narrower than the last species. It is angulated—the "corona" extends further along the margin of the "cucullus," which is sharply pointed on the anal angle, and bears a proportionately smaller bunch of spines than does *paludis*. The "harpe" is boot-shaped, the toe long, much like the last species, but the heel is longer and strongly curved outwardly. The "clavus" is slightly shorter than in *paludis*, and often blunter at the tip, almost obtuse. The "cornuti" are long and fine, and from ten to twelve in number.

The genitalia of these three species are of similar type, but the remaining species which I have examined depart markedly from them.

H. crinanensis has the "cucullus" very much narrower than either *lucens* or *paludis*, being nearly twice as long as

broad. It bears the "corona" only on the upper fourth of the margin, and is almost covered by spines. The "harpe" is without the boot-shaped termination, and is attached loosely to the stem of the "clasper." Beside the "harpe" is a thin semicircular plate of hard chitin serrated on its outer edge. This flap is attached loosely to the thin chitin of the inner surface of the valve, and appears to move readily backwards and forwards. The clavus is stout and incurved, very like that of *H. nictitans*, but is accompanied by a quadrate chitinous plate deeply serrated on its inner edge. The "cornuti," about twelve in number, are long and thick.

Thus far our British species. I am adding two exotic forms on account of their interest.

In *H. americana* (*atlantica*) we find the link between the last-named species and the other members of the group. The "valve" is nearly equal in width throughout its length, the "cucullus" being scarcely wider than the rest of the valve. The "corona" extends along three parts of the margin, and the "cucullus" is very heavily spined along the inner margin. The "harpe" is less bifurcate than in *H. paludis*, the "heel" being scarcely developed. The "clavus" is short and stout, claw-shaped, with a naked point, and is accompanied by a quadrate chitinous plate, toothed on its inner edge, and very like the similar appendage in *H. crinanensis*. The "cornuti" are of medium size, even in length, and about fourteen in number.

Quite recently I have found amongst a number of foreign *Hydroecias* given to me some time ago by Dr. Chapman a male labelled as from Turkestan, which we had catalogued after a preliminary examination as being *H. crinanensis*. More careful examination has proved that it does not belong to this species, but to another, of which, so far as I know, the genitalia have not been examined. This is again practically indistinguishable from the other species of the *nictitans* group. Its peculiarity is that the "valves" narrow off to the "cucullus," which is exceedingly narrow with parallel sides. The "harpe" without a foot, is just free from the surface of the "valve," more so than in *H. crinanensis*. The chitinous flap also found in *H. crinanensis* is very narrow. The "clavus" is claw-shaped, strong and thick, and is not accompanied by a chitinous plate as in the case of

H. crinanensis and *H. americana*. The "cornuti" are very short, even in length, and about twenty-four in number.

It is, of course, quite possible, though extremely unlikely, that this insect may have been differentiated from the other *Hydroecias*, and have received a name. I would therefore suggest, conditionally, the name of *H. asiatica*, after the continent in which the label asserts it was captured, and append a description.

Hydroecia asiatica, ♂. Of the size of *H. nictitans*. F.-w. reddish-brown, orbicular and reniform stigmata somewhat paler, the former indistinct; the latter nearly full, being defective in the centre towards the base of the wing, the two lobes exteriorly uniform, the interior lines suffused. H.-w. lighter basally. From a single male labelled Syrt Naryn, Ost Turkestan. H. Rolle, Berlin, S.-W. N.

A further point of interest in this group of insects is the heavy pair of pencils of hairs upon the early abdominal segments, and the pockets in which they are contained. These are very evident, except in *H. nictitans*, in which species, if they occur, it is only in a much reduced and delicate form.

The females of the group provide fewer points for particular description. The main details upon which they can be differentiated are few, and as they present considerable discrepancies, I must acknowledge that I offer these notes with much diffidence as regards *paludis* and *lucens*. I depend upon the form of the genital plate and the lodix (*i. e.* the posterior edge of the seventh sternite).

In *H. nictitans* the genital plate is wide and shallow, the central excavation commencing from near the extremities, and presenting a wide right-angular cut. The lateral creases are near the upper (posterior) extremities. The "lodix" has a central narrow excavation.

In *H. paludis* the genital plate is wide and deep. The central excavation is shallow and rounded. The lateral creases are below the widest part of the plate. The lodix has a central deep, narrowly triangular, excavation with a rounded end.

In *H. lucens* the genital plate is wide and deep, slightly narrower, more substantial, and perhaps deeper than in *H. paludis*. The central excavation is shallow and rounded. The lateral creases are below the widest part of the plate. The lodix has a central deep triangular

excavation. The genitalia of the females of *H. paludis* and *H. lucens* are extremely difficult to separate. There appears to be no absolutely certain difference except that the genital plate is perhaps more substantial in *H. lucens* than in *H. paludis*, and has also in *H. lucens* a tendency to fold in the centre, doubling over and presenting the appearance of a dark central line, which effect I ascribe to the plate being more full than in *H. paludis*.

In *H. crinanensis* the genital plate is wide and deep. The central excavation is extremely narrow and very deep, extending more than half-way through the plate. The lateral creases are above the widest part of the plate. The lodix has only the smallest possible central triangular excavation.

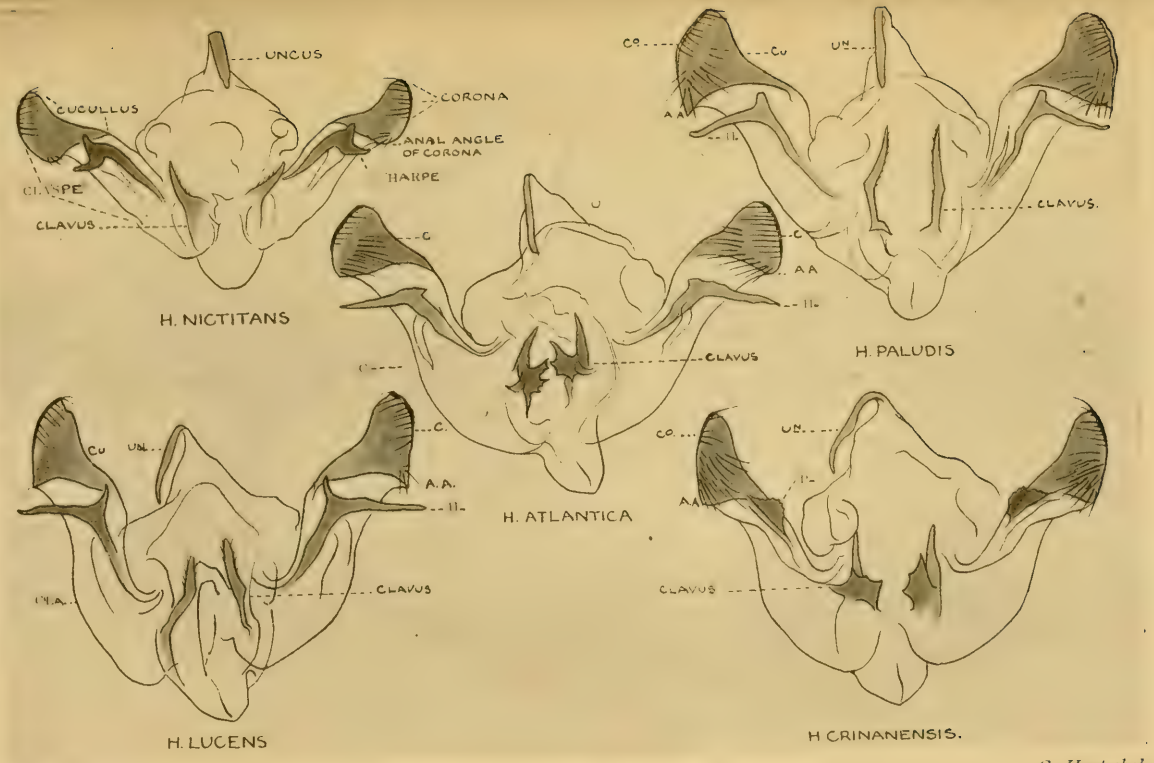
In *H. americana* the genital plate is wide and deep, the central excavation being V-shaped. The lateral creases, diverging from about the centre of the side of the plate, extend obliquely in a straight line until they are lost in the posterior margin of the ninth segment. The excavation in the centre of the lodix appears as a wide sweeping curve. (The specimen from which this description is taken is reasonably assumed to be *H. atlantica*.)

The number of specimens examined for these details of genitalia formation is as follows :—

Number of specimens examined.	Mounted.		Examined dry.
	Male.	Female.	
H. nictitans	25	8	60
H. paludis	25	8	30
H. lucens	27	11	100
H. crinanensis	8	5	96
H. atlantica	7	1 (?)	
H. asiatica	1		

These differences in the appendages cannot be referred to geographical variation as, apart from their being too considerable, our four British species, though each having a special area of distribution (except *nictitans*, which is very widespread), have unquestionably no impediments to freely crossing with each other. But there are no indications that such ever takes place, there being no specimen at all intermediate discovered amongst all the examples examined.

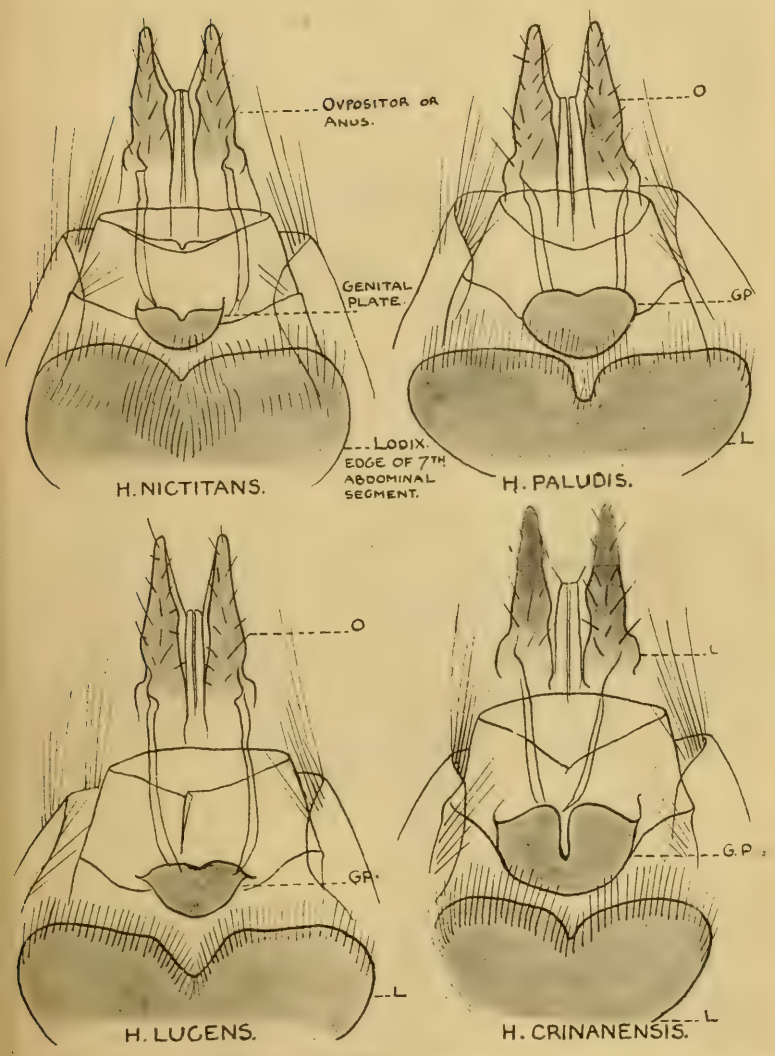
In *Acronicta psi* and *tridens* we have a very similar case, affecting two species; the group before us presents eight. *Psi* and *tridens* have very different larvae. In the species before us we have had practically nothing done in the way



F. Gatter, del.

C. Hentschel

HYDROECIA, MALES.



F. Gatter, del. *C. Hentschel.*

HYDROECIA, FEMALES.

Photo, F. N. Pierce. *C. Hentschel.*

HYDROECIA NICTITANS, Bkh.

Photo, F. N. Pierce. *C Hentschel.*

HYDROECIA PALUDIS, Tutt.

Photo, F. N. Pierce.

C. Hentschel.

HYDROECIA LUCENS, H. Sch.

C. Hentschel.

Photo, F. N. Pierce.

HYDROECIA CRINANENSIS, Burrows.

Photo, F. N. Pierce. *C. Hentschel.*

HYDROECIA AMERICANA, Spr.

Photo, F. N. Pierce. *C. Hentschel.*

HYDROECIA ASIATICA, n. sp.

of breeding the larvae of the different species side by side. Even if this were done, the larvae, being concealed feeders, would probably present no characters to readily distinguish them from each other, or from a considerable number of allied species, which are abundantly distinct in every aspect.

It may, however, be pointed out from the "geographical variation" point of view, that *lucens* and *paludis*, the most distinct from each other of all the species in ordinary characters, especially colour, have habitats that are mostly distinctly specialised and separate for each of them; and at the same time that the genitalia of these two species are least abundantly distinct from each other than those of any other pair of species. It is therefore highly probable that these two forms are the most recent in separating from one another, and if any one chooses to call them geographical forms, I probably differ from him less as to facts than as to definitions of terms.

Explanation of Plates LI–LVIII.

Pl. LI. Male appendages of *H. nictitans* × 11.
" " *H. paludis* × 10.
" " *H. lucens* × 9.
" " *H. crinanensis* × 10.
" " *H. americana*, Spr. × 9.
(*H. atlantica*, Smith).

The lettering is explanatory.

Pl. LII. Extremities of ♀ abdomina of *H. nictitans* × 13.
" " " *H. lucens* × 12.
" " " *H. paludis* × 11.
" " " *H. crinanensis* × 13.

The lettering is explanatory.

Pl. LIII–LVIII. Photographs of ♂ appendages and of ♀ end segments.

LIII. *nictitans* ♂ × 15, ♀ × 18.
LIV. *paludis* ♂ × 17, ♀ × 16.
LV. *lucens* ♂ × 16, ♀ × 17.
LVI. *crinanensis* ♂ × 16, ♀ × 8.
LVII. *americana* ♂ × 13, ♀ × 13.
LVIII. *asiatica* ♂ × 14.

XXXIV. *On the Dates of the Publications of the Entomological Society of London.* By the Rev. G. Wheeler, M.A., F.Z.S.

[Read December 6th, 1911.]

Some months ago I was instructed by the Council, as a part of my secretarial work, to find out as far as possible, from the printers who had from time to time been employed by the Society, the precise dates of publication of the various parts of the volumes of our Transactions, since some of these dates were crucial with regard to the priority of names in a number of species. Certain details on this part of the matter, which may possibly be of interest, I have thought it better to place together in an Appendix (*v.* App. *E*), and it will be sufficient to say here, that though I received most courteous replies from all those firms which I could trace as representing those formerly employed by the Society, very large gaps remained which I attempted to fill by reference to old Minute Books of our own Society, by the help given by the dated list uniformly kept by the Linnean Society of all publications received by them, and where this failed through the loss of one of their books, by reference to the British Museum copy in which the date of reception is stamped on the back of each part. These means, however, were not as efficacious as might have been expected, owing to the extreme irregularity with which copies were sent out; as an instance I might quote the case (by no means an isolated one) in which the Linnean Society received on August 11th, 1868, parts 1 and 2 of the New Series, together with vol. iii, pt. 3, vol. iv, pts. 4 and 5, and vol. v, pt. 8, of the previous series. It will readily be seen that this afforded little help in fixing precise dates, though there are one or two instances in which these will be the nearest attainable. Up till 1850 the only date printed on the parts was that of the year; from that time till 1896 the month only was added, except from 1881 to 1885 inclusive, when the day of the month was printed on the cover, but not at the bottom of the first page of each separate paper, where only the month appeared as in other years. In this case both the Linnean Society and the British Museum afforded help, for I found

the cover in one or other of these libraries in every case where there was no copy in its original cover in our own possession; but, unfortunately, only in one single case does this date seem to have been correct, rarely even approximately so, and sometimes glaringly deceptive. After this revelation it will not be surprising to learn that when only the month was given, parts were frequently dated one month, and sometimes two, or even three, prior to the actual time of publication. At last I bethought me to apply for help, in very doubtful cases, to Messrs. Longmans, Green & Co., who have published for the Society from the first, and who interpreted my request with such astonishing generosity as to send me, in the course of a few days, a complete list of the days on which they received each part of each volume from 1834 to 1911. Now here, it might be said, is all that can be desired as giving the exact date of publication in every case. But this is by no means the fact, for the Society has also from the beginning acted as its own publisher, and the dates at which the various parts were delivered by the printers at the Society's rooms are often (when obtainable) earlier than those at which they were received by Messrs. Longmans & Co.; and, in fact, a comparison of the dates leads one to suppose that they were always in former times delivered direct to the Society, who forwarded copies to Messrs. Longmans & Co., except that once or twice in August, when there was apparently no one to receive them at the Society's rooms, Messrs. Longmans & Co. were not kept waiting for their copies, which seem to have been then delivered direct from the printers.

In a very able letter written by Mr. J. H. Durrant to a former Secretary, a copy of which he has kindly placed at my disposal, it is argued that the delivery of books to the Society does not constitute publication, because the general public has not access to the Society's rooms. This argument would of course be unanswerable if the premises were correct, but that is the very reverse of being the case. It is indisputable that at the present time non-members can, and frequently do, both write and come in person to buy copies of the current number of the Transactions, and it is actually the only way in which back numbers of more than three or four years past can be obtained. I make this statement on the authority of the Resident Librarian, and it is easy for any unbeliever to test the matter for himself; but it might be supposed

that in former and more exclusive times access to non-members would have been impossible, were it not that a letter from the late Mr. J. W. Dunning, at that time Secretary and afterwards President of the Society, is appended to the Minutes of the Council Meeting for April 4th, 1864, in which he complains that the time of the Librarian is greatly taken up by the idle chatter of Entomologists, the worst offenders, as a rule, not being members (there were no Fellows then, as it was before Mr. Dunning obtained the Charter) of the Society, but adding that all Entomologists, *whether members or not*, were always welcome in the Society's rooms. This completely disposes of the argument that non-members had not access to the rooms, and in combination with the announcement printed on each part that it was "sold at the Society's rooms," shows that the outside public could obtain copies from that quarter. Whenever, therefore, the dates of delivery at the Society's rooms and at Messrs. Longmans & Co. are both obtainable, the earlier will always be the date of publication. In the appended table both are given when available, but the earlier, the actual date of publication, is printed in thick type. The Society has only occupied its present quarters since late in 1875, and has only had the advantage of a Resident Librarian since the beginning of 1876. Previously the Librarian, who was then a paid official, was only bound to be present on Monday afternoons, and it might have been argued that it was only on these days that the Society's publications were to be obtained; but the dates of the reception of the Transactions by the Linnean Society, where they were formerly sent direct by our Society, prove conclusively that there was no particular day in the week when these publications could be obtained. In the early years of the Transactions it will be seen that on a few occasions they were received by the Linnean Society at an earlier date than by Messrs. Longmans & Co., and that this once occurs at a time when the date of delivery by the printer at our Society's rooms is unobtainable, and when the date of publication is not given in the Minutes; it is, however, obvious that the Entomological Society must have received these parts before they could forward them to the Linnean Society; the date on which the latter received them is therefore the earliest date available, but it must be understood that it can only be stated that this part was published *at least* as early as the date given, and possibly earlier. From

1879 till 1896, whenever precise information from the printers is not forthcoming, there is another source available for fixing, approximately at any rate, the date of publication, for during this period the copies were all sent out from the Society's rooms, and an exact list was kept of the dates on which any given part was posted. This sometimes serves as a useful check, and in one somewhat notorious case, that of Part 1 for 1894, renders nugatory the decree of the Society, based on the report of a Special Committee, that the date of the part should be May 11th, since the Society sent out the revised copies on May 2nd, and must therefore have received them by that date at the latest; and it is beyond the power not merely of a Society or its Council, but even of Omnipotence itself, to alter the date at which a past event has actually taken place. The date of this part is, however, so complicated a question that it will be best treated of in an appendix by itself (*v.* App. *D*).

Since 1896 the number of pages of the Proceedings issued with each part of the Transactions has been published at the beginning of each completed volume, and since 1887 the part of the Transactions in which the Proceedings appeared is indicated at the bottom of the pages of the latter, but up to that time there was no means of dating the Proceedings except from the separate parts as they were issued, or from their original covers; bound volumes gave no information whatever on the subject. I have, however, been fortunate enough to find the separate parts or the original covers for the most part in our own Library; and when they have been wanting there, I have found them in some cases in the British Museum, and in others in the Library of the Linnean Society. This applies to all the Proceedings published with the Transactions, but, unfortunately, from 1840 to 1846 inclusive they were published in separate sheets; which never went through Messrs. Longmans' hands at all, nor were they printed by the same firm that printed the Transactions, and it is these two circumstances, combined with the fact that they were sent to the Linnean Society with the Transactions, that enable me to assert that the latter Society in those days received its copies of our publications direct from our own rooms. The dates of publication of these seven years of our Proceedings are therefore on a totally different footing from any others, and must be treated of separately (*v.* App. *B*).

In the course of searching for information as to these various dates, many old books belonging to our Society have come to light, and it seems to me well that these should be put on record: a list of them is therefore appended (*v.* App. *F*).

It only remains for me to record my thanks to those who have given me such invaluable help in working out this problem: to Dr. Daydon Jackson and Mr. Kappel at the Linnean Society; to Messrs. Taylor & Francis; C. F. Roworth; West, Newman & Co.; and above all to Messrs. Longmans, Green & Co., without whose kind help my work would have been impossible.

DATES OF PUBLICATION FROM 1834 TO 1895.

First Series.

Vol.	Part.	No. of pages of Proceedings.	Date of delivery by Printers to Society.	Date of delivery at Longmans'.	Date of arrival at Linnean Society.
I	1	i–xiii (xiv blank)	**Nov. 7, 1834**	Nov. 8, 1834	
	2	xv–xlii	**Oct. 2, 1835**	Oct. 6, 1835	
	3	xliii–lxxxviii	**Jan. 17, 1837**	Jan. 18, 1837	
II	1	i–xxxviii		Feb. 16, 1838	[a] **Feb. 5, 1838**
	2	(none)		**Sep. 5, 1838**	Nov. 6, 1838
	3	xxxix–lxviii	Aug. 5, 1839	**July 1, 1839**	Oct. 19, 1839
	4	lxix–xci	[b] **Nov. 2, 1840**	Nov. 11, 1840	Nov. 16, 1841
III	1	i–xiii		**Jan. 27, 1842**	Feb. 1, 1842
	2	[The Journal	[b] **Sep. 2, 1842**	Sep. 16, 1842	Mch. 6, 1843
	3	of Proceed-	[b] **Jan. 2, 1843**	Feb. 20, 1843	Mch. 6, 1843
	4	ings from	[b] **Jan. 1, 1844**	[c] Jan. 17, 1844	Feb. 6, 1844
IV	1	Jan. 1840 to	[b] **April 7, 1845**	May 29, 1845	May 24, 1845
	2	Dec. 1846 was	[b] **Nov. 3, 1845**	Nov. 25, 1845	Nov. 29, 1845
	3	published	[b] **Mch. 2, 1846**	April 20, 1846	April 21, 1846
	4	separately.	[b] **Mch. 1, 1847**	Mch. 8, 1847	Mch. 2, 1847
	5	*v.* App. *B.*]	[b] **June 7, 1847**	June 23, 1847	Feb. 16, 1848
V	1	[c] i–iv	[b] July 5, 1847	**June 30, 1847**	Feb. 16, 1848
	2	v–xvi	[b] Oct. 4, 1847	**Sep. 30, 1847**	Feb. 16, 1848
	3	xvii–xxviii	[b] Jan. 24, 1848	**Jan. 12, 1848**	Feb. 16, 1848
	4	[d] xxix–xxx		**June 1, 1848**	Mch. 5, 1850
	5	[d] xxxi–xlii		**Aug. 18, 1848**	Mch. 5, 1850
	6	(none)	[b] **May 7, 1849**	May 8, 1849	Mch. 5, 1850
	7	xliii–lxvi		**Sep. 4, 1849**	Oct. 3, 1850
	8	lxvii–lxxiv	[b] **Nov. 5, 1849**	Nov. 6, 1849	Mch. 5, 1851
	9	lxxv–lxxxix		**Feb. 8, 1850**	Mch. 5, 1851

[a] The Secretary announced on Jan. 1st that the Part would be ready that week, but there is no evidence that it was so.

[b] This and the following dates up to Oct. 7th, 1850, are those of the Meetings next after the delivery of the Parts at the Society's room, and are taken from the Minute Books.

[c] Not mentioned on cover, with rest of contents, but issued with this part.

[d] These two parts are not available in the original wrappers, but the lettering at the foot of the pages leaves no doubt of the correctness of this division.

[e] This date is somewhat uncertain, but (not being the earliest) is fortunately not of much importance.

SECOND SERIES.

Vol.	Part.	No. of pages of Proceedings.	Date on Part.	Date of delivery by Printers to Society.	Date of delivery at Longmans'.
I	1	(none)		[b] **April 1, 1850**	April 30, 1850
	2	1–16	Oct.	[b] Oct. 7, 1850	**Sep. 28, 1850**
	3	(none)	Dec.	**Nov. 20, 1850**	Nov. 29, 1850
	4	17–48	Mch.	**Feb. 21, 1851**	Mch. 1, 1851
	5	49–80	June	**May 31, 1851**	**May 31, 1851**
	6	81–96	Sep.	Sep. 1, 1851	**Aug. 29, 1851**
	7	97–112 [f]	Dec.	**Nov. 17, 1851**	Nov. 18, 1851
	8	113–176	Mch.	**April 12, 1852**	**April 12, 1852**
II	1	1–8	June	**June 14, 1852**	June 24, 1852
	2	9–16	Sep.	Sep. 6, 1852	**Sep. 2, 1852**
	3	17–32	Dec.	Dec. 27, 1852	**Dec. 24, 1852**
	4	33–64	Mch.	**Mch. 7, 1853**	April 5, 1853
	5	65–112	June	**June 6, 1853**	June 16, 1853
	6	113–120	Sep.	**Aug. 29, 1853**	Sep. 5, 1853
	7	121–136	Jan.	**Dec. 26, 1853**	Dec. 27, 1853
	8	137–146	April	**April 3, 1854**	**April 3, 1854**
III	1	1–8	July	**June 30, 1854**	**June 30, 1854**
	2	9–24	Oct.	Nov. 1, 1854	**Oct. 28, 1854**
	3	25–40	Jan.	**Jan. 9, 1855**	**Jan. 9, 1855**
	4	41–74	April	**April 23, 1855**	**April 23, 1855**
	5	75–90	July	**Aug. 6, 1855**	Aug. 12, 1855
	6	91–106	Oct.	**Nov. 19, 1855**	**Nov. 19, 1855**
	7	107–114	Jan.	**Feb. 4, 1856**	Feb. 5, 1856
	8	115–170	April	**April 21, 1856**	April 25, 1856
IV	1	(none)	July	**July 7, 1856**	July 10, 1856
	2	1–16	Oct.	**Oct. 11, 1856**	Oct. 15, 1856
	3	17–32 [g]	Jan.		**Feb. 21, 1857**
	4	33–56	April	**April 27, 1857**	May 1, 1857
	5	(none)	July	[k] Aug. 31, 1857	**Aug. 20, 1857**
	6	57–96	Jan.	**Jan. 25, 1858**	Mch. 11, 1858
	7	(none)	April	**April 5, 1858**	**April 5, 1858**
	8	97–116 and vol. v, 1–16	July	**July 5, 1858**	July 23, 1858
	9	117–132	Dec.	**Dec. 27, 1858**	Jan. 17, 1859
V	1	17 [h]–40 [j]	Feb.	**Mch. 7, 1859**	Mch. 14, 1859
	2	(none)	May	**June 27, 1859**	**June 27, 1859**
	3	41–72	Sep.	**Oct. 3, 1859**	Dec. 7, 1859
	4	(none)	Nov.	**Jan. 4, 1860**	Jan. 12, 1860
	5	73–104	Mch.	**May 7, 1860**	May 29, 1860
	6	105–112	July	Aug. 8, 1860	**Aug. 7, 1860**
	7	(none)	Nov.	Nov. 5, 1860	**Nov. 3, 1860**
	8	113–136	Feb.	**Feb. 25, 1861**	Mch. 14, 1861
	9	137–148	June	**July 1, 1861**	July 26, 1861
	10	149–187	Oct.	**Nov. 4, 1861**	Nov. 18, 1861
	11	188–249		**April 14, 1862**	April 22, 1862

[f] Pp. 97–104 are wrongly numbered 33–40 in the original.

[g] Pp. 17–32 are wanting in the separate parts in the Ent. Soc. Library, but were received at the British Museum with Part 3 on March 13, before Part 4 had left the Printers' hands.

[h] Pp. 1–16 were published with vol. iv., Part 8 (*v. supra*).

[j] Pp. 17–40 are wanting in the separate parts, but were received at the B. M. on May 20th, so were issued with Part 1.

[k] Apparently there was no one to receive the Society's copies earlier in August, and Messrs. Longmans' must have been delivered direct by the Printers.

THIRD SERIES.

Vol.	Part.	No. of pages of Proceedings.	Date on Part.	Date of delivery by Printers to Society.	Date of delivery at Longmans'.
I	1	1–48	Mch.	**April 7, 1862**	April 8, 1862
	2	49–64	May	**May 29, 1862**	June 2, 1862
	3	(none)	Aug.	**Aug. 11, 1862**	Aug. 12, 1862
	4	65–88	Nov.	**Nov. 17, 1862**	**Nov. 17, 1862**
	5	89–112	Feb.	**Feb. 23, 1863**	**Feb. 23, 1863**
	6	113–142	May	**June 8, 1863**	June 12, 1863
	7	143–166	Oct.	**Oct. 5, 1863**	Nov. 17, 1863
	8	167–182	Dec.	**Jan. 25, 1864**	**Jan. 25, 1864**
	9	183–218	Mch.	**April 4, 1864**	**April 4, 1864**
II	1	(none)	May	**July 4, 1864**	July 5, 1864
	2	1–32	Aug.	**Aug. 15, 1864**	Aug. 17, 1864
	3	33–48	Nov.	**Nov. 28, 1864**	Dec. 5, 1864
	4	49–80	Mch.	**Mch. 13, 1865**	Mch. 18, 1865
	5	81–112	Sep.	Sep. 29, 1865	**Sep. 27, 1865**
	6	113–174	Feb.	**Mch. 19, 1866**	**Mch. 19, 1866**
III	1	[l] (none)	Sep.	**Oct. 3, 1864**	Oct. 4, 1864
	2		Aug.	**Aug. 14, 1865**	Aug. 18, 1865
	3		Sep.	**Sep. 29, 1866**	Oct. 7, 1866
	4		June	**June 17, 1867** [o]	**June 17, 1867**
	5		April		**April 29, 1868**
	6		Jan.		**Jan. 26, 1869**
	7		Oct.		**Oct. 13, 1869**
IV	1	[l] (none)	June	**July 3, 1865**	July 10, 1865
	2		July [n] / Aug.	**Sep. 2, 1867**	Sep. 3, 1867
	3		Nov.	**Dec. 9, 1867** [o]	Dec. 24, 1867
	4		Feb.		**Mch. 23, 1868**
	5		May		**May 27, 1868**
V	1	(none)	Oct.	**Nov. 13, 1865**	Nov. 17, 1865
	2	(none)	April	**April 16, 1866**	April 17, 1866
	3	1–8	June	**July 2, 1866**	July 17, 1866
	4	9–32	Dec.	**Dec. 31, 1866**	Jan. 10, 1867
	5	(none)	Mch.	**Mch. 4, 1867**	Mch. 6, 1867
	6	33–84	May	**May 6, 1867** [o]	May 8, 1867
	7	85–144 [m]	Dec.		**Dec. 30, 1867**
	8				**Mch. 23, 1868**

FOURTH SERIES.

Vol.	Part.	No. of pages of Proceedings.	Date on Part.	Date of delivery by Printers to Society. [p]	Date of delivery at Longman's.
1868	1	i–xvi	April		**April 29, 1868**
	2	xvii–xxiv	July		**July 13, 1868**
	3	xxv–xxxvi	Sep.		**Sep. 28, 1868**
	4	(none)	Dec.		**Dec. 22, 1868**

[l] Vols. iii and iv were on special subjects and published at irregular intervals, without Proceedings.

[m] Pp. 105–144 are repeated in Part 8.

[n] Some of the papers in this part are dated July and some August.

[o] No Printer's dates beyond these are to be had (*v.* App. *E*).

[p] The dates of reception at the British Museum are available throughout, and those at the Linnean Society for 1875 to 1878, but in no case are they earlier than those of delivery at Messrs. Longmans.

FOURTH SERIES (*continued*).

Vol.	Part.	No. of pages of Proceedings.	Date on Part.	Date of delivery by Printers to Society.[p]	Date of delivery at Longmans'.
1868	5	xxxvii–lxxxviii			**Feb. 16, 1869**
1869	1	i–viii	April		**April 26, 1869**
	2	(none)	May		**May 28, 1869**
	3	(none)	June		**June 22, 1869**
	4	ix–xviii	Aug.		**Aug. 3, 1869**
	5	(none)	Dec.		**Dec. 14, 1869**
	6	xix–lviii			**Feb. 7, 1870**
1870	1	(none)	Mch.		**Mch. 14, 1870**
	2	i–xvi	June		**June 16, 1870**
	3	xvii–xxxi[q]	Aug.		**Aug. 29, 1870**
	4	(none)	Dec.		**Dec. 20, 1870**
	5	xxxi[q]–lxxx			**Feb. 20, 1871**
1871	1	(none)	Mch.		**Mch. 28, 1871**
	2	i–xvi	May		**May 22, 1871**
	3	xvii–xxxii	Aug.		**Aug. 8, 1871**
	4	(none)	Dec.		**Dec. 19, 1871**
	5	xxxiii–lxxxii			**Feb. 19, 1872**
1872	1	i–viii	April		**April 18, 1872**
	2	ix–xvi	May		**May 15, 1872**
	3	xvii–xxiv	Aug.		**Aug. 16, 1872**
	4	xxv–xxxvi	Dec.	**Dec. 30, 1872**	Dec. 31, 1872
	5	xxxvii–lxxxvi		**Mch. 10, 1873**	Mch. 12, 1873
1873	1	(none)	Mch.	**Mch. 31, 1873**	April 1, 1873
	2	i–xvi	May	May 1873	**May 20, 1873**
	3	xvii–xxiv	Aug.	**Aug. 5, 1873**	Aug. 11, 1873
	4	(none)	Oct.	**Oct. 13, 1873**	**Oct. 13, 1873**
	5	xxv–lii		**Mch. 2, 1874**	Mch. 3, 1874
1874	1	(none)	Feb.	**Feb. 23, 1874**	**Feb. 23, 1874**
	2	i–viii	April	**April 27, 1874**	April 29, 1874
	3	(none)	July	**June 1874**	July 7, 1874
	4	ix–xxiv	Dec.	[o] Dec. 1874	**Dec. 24, 1874**
	5	xxv–lxxx			**Mch. 10, 1875**
1875	1	i–viii[r]	May		**May 29, 1875**
	2	ix–xvi	Sep.		**Sep. 28, 1875**
	3	(none)	Nov.		**Nov. 30, 1875**
	4	(none)	Dec.		**Jan. 6, 1876**
	5	xvii–lxviii			**Mch. 21, 1876**
1876	1	i–viii	May		**May 20, 1876**
	2	(none)	June		**June 27, 1876**
	3	ix–xxiv	Oct.		**Nov. 2, 1876**
	4	xxv–xxxii	Nov.		**Dec. 23, 1876**
	5	xxxiii–lxxxvii			**Feb. 23, 1877**
1877	1	(none)	April		**April 17, 1877**
	2	(none)	June		**July 2, 1877**
	3	i–xvi	Oct.		**Oct. 16, 1877**
	4	xvii–xxxii	Dec.		**Dec. 31, 1877**
	5	xxxiii–xciii			**Mch. 22, 1878**
1878	1	i–viii	April		**April 24, 1878**
	2	ix–xxiv	July		**July 23, 1878**
	3	xxv–xl	Oct.		**Oct. 16, 1878**
	4	xli–xlviii	Dec.		**Jan. 6, 1879**
	5	xlix–lxxxviii			**Mch. 3, 1879**

[q] P. xxxi was published in Part 3 to the end of the Minutes for July 4th; and the whole in Part 5.

[r] With an Appendix on "Priority," pp. i–xlii.

Vol.	Part.	No. of pages of Proceedings.	Date on Part.	Date of delivery by Printers to Society.	Date of delivery at Longmans'.	Date of Posting from the Society's Rooms.
1879	1	(none)	April		**May 2, 1879**	May 3, 1879
	2	i–xxiv	July		Aug. 15, 1879	**Aug. 7, 1879**
	3, 4	xxv–xlviii	Dec.		Dec. 30, 1879	**Dec. 27, 1879**
	5	xlix–xcix			**Feb. 23, 1880**	Feb. 25, 1880
1880	1	(none)	Mch.		**April 1, 1880**	April 7, 1880
	2	i–viii	June		July 8, 1880	**July 5, 1880**
	3	ix–xxiv	Oct.		**Oct. 12, 1880**	Oct. 14, 1880
	4	xxv–xxxii	Dec.	[t] Dec. 23, 1880	Jan. 5, 1881	**Dec. 31, 1880**
	5	xxxiii–lxiv		Mch. 2, 1881	**Mch. 7, 1881**	Mch. 9, 1881
1881	1	(none)	April 6	*April 19, 1881*	April 20, 1881	**April 14, 1881**
	2	i–viii	July 6	July 12, 1881	July 14, 1881	**July 13, 1881**
	3	ix–xx	Sept. 7	Sept. 7, 1881	Sept. 12, 1881	**Sept. 8, 1881**
	4	xxi–xxxvi	Dec. 22	Dec. 22, 1881	Dec. 30, 1881	**Dec. 28, 1881**
	5	xxxvii–lxxxii		Feb. 2, 1882	Feb. 8, 1882	**Feb. 6, 1882**
1882	1	(none)	April 1	April 5, 1882	April 12, 1882	[u] **April 6, 1882**
	2	i–viii	July 5	July 5, 1882	July 18, 1882	**July 12, 1882**
	3	ix–xvi	Sept. 7	Sept. 6, 1882	**Sept. 14, 1882**	Sept. 18, 1882
	4, 5	[s] xvii–lxii	Feb. 7 (1883)	Jan. 7, 1883	**Feb. 12, 1883**	Feb. 14, 1883
1883	1	(none)	Mch. 7	Mch. 12, 1883	Mch. 19, 1883	**Mch. 17, 1883**
	2	i–xii	June 1	May 30, 1883	June 7, 1883	**May 31, 1883**
	3	xiii–xx	Aug. 1	Aug. 9, 1883	**Aug. 14, 1883**	Sept. 1, 1883
	4	(none)	Nov. 27	Nov. 29, 1883	Jan. 2, 1884	**Dec. 12, 1883**
	5	xxi–lxxxi	Feb. 6 (1884)	Feb. 13, 1884	**Feb. 20, 1884**	Feb. 21, 1884
1884	1	i–viii	Apl. 30	May 4, 1884	**May 14, 1884**	May 15, 1884
	2	(none)	July 2	July 2, 1884	**July 3, 1884**	July 5, 1884
	3	ix–xxiv	Oct. 31	Nov. 12, 1884	Nov. 11, 1884	**Nov. 10, 1884**
	4	(none)	Dec. 3	Nov. 30, 1884	Dec. 11, 1884	**Dec. 10, 1884**
	5	xxv–lxiii	Feb. 28 (1885)	Mch. 4, 1885	Mch. 6, 1885	**Mch. 5, 1885**
1885	1	(none)	Apl. 30	June 1, 1885	June 4, 1885	**June 3, 1885**
	2	i–viii	Aug. 5	Aug. 20, 1885	**Aug. 22, 1885**	Aug. 27, 1885
	3	ix–xvi [v]	Sep. 22	Oct. 6, 1885	Oct. 9, 1885	**Oct. 8, 1885**
	4	(none)	Dec. 2	Dec. 11, 1885	Dec. 18, 1885	**Dec. 16, 1885**
	5	xvii [v]–lxv.	Feb. 3 (1886)	Feb. 12, 1886	**Feb. 13, 1886**	**Feb. 13, 1886**
1886	1	i–xii	Mch.	Mch. 31, 1886	**April 8, 1886**	**April 8, 1886**
	2	xiii–xxviii	June	June 30, 1886	July 7, 1886	**July 5, 1886**
	3	xxix–xlviii	Oct.	Oct. 1, 1886	Oct. 29, 1886	**Oct. 27, 1886**
	4	xlix–lvi	Dec.	Dec. 30, 1886	**Dec. 29, 1886**	**Dec. 29, 1886**
	5	lvii–cix	Feb.	Feb. 22, 1887	Feb. 26, 1887	**Feb. 23, 1887**
1887	1	i–xx	Apr.	Apr. 30, 1887	Apr. 30, 1887	**Apr. 27, 1887**
	2	xxi–xxiv	June	May 30, 1887	June 20, 1887	**June 8, 1887**
	3	xxv–xl	Sep.	Sept. 30, 1887	**Oct. 6, 1887**	Oct. 8, 1887
	4	xli–lx	Dec.	Jan. 4, 1888	Jan. 10, 1888	**Jan. 4, 1888**
	5	lxi–xcii	Feb.	Feb. 17, 1888	Feb. 22, 1888	**Feb. 20, 1888**
1888	1	i–viii	Mch.	Mch. 23, 1888	**Mch. 26, 1888**	Mch. 30, 1888
	2	ix–xx	June	June 27, 1888	**June 30, 1888**	July 9, 1888

[s] On cover "xxv," incorrectly.
[t] These dates are not absolutely reliable, those in italics are obviously incorrect (*v.* App. *E*).
[u] The majority were posted on April 19th, but the issue on April 6th was not by any means confined (as in other cases of early issue where the date is not admissible) to the Council.
[v] Wrongly printed on cover as xxiv and xxv.

Vol.	Part.	No. of pages of Proceedings	Date on Part.	Date of delivery by Printers to Society.	Date of delivery at Longmans'.	Date of Posting from the Society's Rooms.
	3	xxi–xxxii	Oct.	Oct. 31, 1888	**Nov. 21, 1888**	**Nov. 21, 1888**
	4	xxxiii–xl	Dec.	Dec. 19, 1888	Dec. 24, 1888	**Dec. 21, 1888**
	5	xli–xcv	Mch.	Jan. 31, 1889	Feb. 5, 1889	**Feb. 1, 1889**
1889	1	i–viii	Mch.	Apr. 1, 1889	**Apr. 15, 1899**	**Apr. 15, 1889**
	2	ix–xxiv	June	June 27, 1889	July 1, 1889	**June 27, 1889**
	3	xxv–xliv	Oct.	Oct. 30, 1889	**Oct. 26, 1889**	Oct. 28, 1889
	4	xlv–lxii	Dec.	Dec. 31, 1889	**Jan. 9, 1890**	Jan. 10, 1890
	5	lxiii–cvii	Jan. 31	Feb. 5, 1890	Feb. 11, 1890	**Feb. 8, 1890**
1890	1	i–xii	Apr.	*Apr. 30, 1890*	Apr. 18, 1890	**Apr. 17, 1890**
	2	xiii–xx	June	June 24, 1890	July 5, 1890	**June 25, 1890**
	3	xxi–xxviii	Sep.	Sep. 30, 1890	**Oct. 1, 1890**	**Oct. 1, 1890**
	4	xxix–xl	Dec.	Dec. 22, 1890	**Dec. 29, 1890**	Dec. 30, 1890
	5	xli–lxxvi		Feb. 10, 1891	**Feb. 13, 1891**	Feb. 14, 1891
1891	1	i–viii	Mch.	Mch. 30, 1891	Apr. 13, 1891	**Mch. 31, 1891**
	2	ix–xiv	June	June 1, 1891	July 4, 1891	**June 1, 1891**
	3	xv–xxii	Oct.	Oct. 6, 1891	Oct. 21, 1891	**Oct. 19, 1891**
	4	xxiii–xxxviii	Dec.	Dec. 30, 1891	Jan. 8, 1892	**Jan. 1, 1892**
	5	xxxix–lxvi	Feb.	Feb. 5, 1892	Feb. 15, 1892	**Feb. 12, 1892**
1892	1	i–xii	Mch.	Mch. 25, 1892	Apr. 4, 1892	**Apr. 2, 1892**
	2	xiii–xx	June	*June 30, 1892*	July 9, 1892	**June 25, 1892**
	3	xxi–xxviii	Nov.	Oct. 30, 1892	Nov. 18, 1892	**Nov. 7, 1892**
	4	xxix–xl	Jan.	Jan. 18, 1893	Jan. 23, 1893	**Jan. 21, 1893**
	5	xli–lxviii	Feb. 2	Feb. 7, 1893	**Feb. 8, 1893**	**Feb. 8, 1893**
1893	1	i–xii	Mch.	Mch. 26, 1893	Apr. 5, 1893	**Mch. 28, 1893**
	2	xiii–xxiv	June	June 1, 1893	June 7, 1893	**June 6, 1893**
	3	(none)	Sep.	Sep. 30, 1893	Oct. 7, 1893	**Sep. 29, 1893**
	4	xxv–xl	Dec.	Dec. 28, 1893	Jan. 1, 1894	**Dec. 29, 1893**
	5	xli–lxvii	Feb. 6	[o] Feb. 15, 1894	**Feb. 12, 1894**	**Feb. 12, 1894**
1894	1	i–xii [w]	[x] Apr.		[x] May 15, 1894	[x] **May 2, 1894**
	2	xiii–xvi	June		June 1, 1894	**May 29, 1894**
	3	xvii–xxiv	Sep.		**Sep. 30, 1894**	Oct. 1, 1894
	4	xxxv–xxxiv	Dec.		Dec. 7, 1894	**Dec. 4, 1894**
	5	xxxv–xcvi	Feb. 5		**Feb. 7, 1895**	**Feb. 7, 1895**
1895	1	i–xvi	Apr. 25		**Apr. 25, 1895**	**Apr. 25, 1895**
	2	(none)	June 1		May 31, 1895	**May 28, 1895**
	3	xvii–xx	Sep. 23		**Sep. 23, 1895**	Sep. 24, 1895
	4	xxi–xl	Dec. 18		Dec. 18, 1895	**Dec. 12, 1895**
	5	xli–lxxxiii	Jan. 31		**Jan. 30, 1896**	Jan. 31, 1896

[w] Not given on cover with list of contents but published with this part.
[x] *v.* App. *D.*

APPENDIX *A*.

ON THE DATES OF THE VOLUME OF TRANSACTIONS PUBLISHED BY THE FORMER ENTOMOLOGICAL SOCIETY.

The date of Part i is definitely fixed by the Minute Book of the Society as being July 1st, 1807, this having been fixed by Resolution as the day for Publication which, as non-members had not access to the meetings, was to be effected by sending copies to several publishing firms ; the part, however, was apparently ready before this date.

Part ii was printed and laid on the table on April 4th, 1809, but owing to an irregularity as to the papers printed, was referred to a Committee, which met on April 17th, and reported to the Meeting held on May 2nd, when it was ordered that it "be forthwith published." As it was ready a month before, there was nothing to delay it.

Part iii was ordered "to be published forthwith" on Sept. 1st, 1812, which was done during the month, as appears by the Minutes of the Meeting of Oct. 7th, but there is nothing to show whether on Sept. 1st it was ready for immediate publication.

The dates are as follows :—

Part i, **July 1st, 1807.**
Part ii, Early in **May 1809** (probably May 3rd).
Part iii, **Sept. 1812.**

APPENDIX *B*.

ON THE DATES OF THE PROCEEDINGS FROM JANUARY 1840 TO DECEMBER 1846.

The Journal of Proceedings for these seven years was printed in sheets of 16 pp. each, and distributed gratis to members, and sold to the public at one shilling per sheet. These were reprinted in 1864, but the original sheets are very scarce ; the Entomological Society does not possess a single copy. There is one, bound by itself, in the Insect Department at South Kensington, presented (almost too generously) by our Society, another, up to p. 144, bound with vol. iv (First Series), in the Hope Department at the Oxford University Museum, a third, bound up with the same volume, at the Linnean Society, and a torn copy in

the British Museum, these being all I have been able to unearth. All gave me the impression of being reprints, but having at last been able, by the courtesy of Mr. O. E. Janson, to inspect a complete copy, unbound, in the exact state in which they were distributed at the Meetings and received by his late father, I found that they all agreed in every respect, including the lettering at the foot of the pages and the fact that the third sheet was numbered II, like the second, the fourth being, however, numbered IV, as in the other copies. These sheets never came into the hands of Messrs. Longmans & Co., and Messrs. Taylor & Francis can find no record of them, though entries in the old Minute Books show that they were printed by the former representatives of their firm. The sheets were ten in number and their contents were as follows :—

I. The year 1840.
II. Jan. 4th, 1841—end of description of *Nigidius grandis*, July 5th, 1841.
III. Rest of July 5th, 1841—end of description of *Monohammus mixtus*, Nov. 1st, 1841.
IV. Rest of Nov. 1st, 1841—definition of genus *Anodonta*, April 4th, 1842.
V. Rest of April 4th, 1842—end of Aug. 1st, 1842.
VI. Oct. 3rd, 1842—nearly end of Nov. 6th, 1843.
VII. Rest of Nov. 6th, 1843 (6 lines)—middle of the description of *Ploiaria bispinosa*, July 1st, 1844.
VIII. Rest of July 1st, 1844—nearly end of July 7th, 1845.
IX. Rest of July 7th, 1845 (8 lines)—end of 1845.
X. The year 1846.

The old Minute Books show that Sheet I was published June 7th, 1841, the only other mentioned being a "new part" on Dec. 4th, 1843; this might from its contents have been either V or VI, but an entry on Oct. 7th, 1844, shows that up to that time only five sheets had been printed, so that this date (Dec. 4th, 1843) must refer to Sheet V, containing the Proceedings up to Aug. 1842. Notices of the printing of these Proceedings are given on the covers of the various parts of vols. iii, iv, and v, as follows: Vol. iii, pt. 1 (published Jan. 27th, 1842) announces Sheet I (published six months previously!) and states that the Proceedings for 1841 are in the Press; pt. 2 (published Sept. 2nd, 1842) announces those for 1840 and 1841, those for 1843 being in the Press; this

notice is repeated in pt. 3 (published Jan. 2nd, 1843); pt. 4 (published Jan. 1st, 1844), and vol. iv, pt. 1 (published April 7th, 1845), announce those for 1840, 1841 and 1842, stating that those for 1843 are in the Press ; vol. iv, pt. 2, and subsequent parts, merely announce that the Journal of Proceedings from 1840 is printed for gratuitous distribution among the members, and for sale to the public, price 1*s.* per sheet. All this is very difficult to reconcile with facts, seeing that the sheets (except I and X) are wholly independent of the end of any year, and frequently end in the middle of a meeting. Probably, however, it implies that Sheets II and III were issued together before Sept. 2nd, 1842, and Sheets IV and V before Jan. 1st, 1844, which corresponds with the fact actually established that Sheet V was issued on Dec. 4th, 1843, though the expression "a new part" of the Proceedings would seem to indicate an earlier date for Sheet IV. This is borne out by the fact that Sheets II, III and IV were received by the Linnean Society on March 6th, 1843, which, taken in connection with the notice on the cover of vol. iii, pt. 2, narrows down the date of Sheet IV to the interval between Jan. 2nd and March 6th, 1843. After Sheet V, the only indication of dates we possess is that Sheet VI was received by the Linnean Society on Nov. 29th, 1845, and Sheet VII on April 21st, 1846.

A Minute of the Council Meeting on Aug. 5th, 1844, directed the Secretary and Treasurer to make arrangements for the continuation of the publication of the Proceedings, and another entry of Oct. 7th states that the Secretary read a letter from Messrs. R. & J. Taylor, "agreeing to publish the Proceedings *in the Annals of Natural History*, on the same terms as originally adopted, they having agreed to alter their bill for the *five* sheets already published." The italics are mine. Here was new light, and a short search in the publication mentioned showed that *all* the Proceedings since 1840 had been so published, and that in every case where the distribution of these sheets could be traced, the date was subsequent to that of the part of the Annals and Magazine of Natural History in which the same information appeared ; it follows, therefore, that these sheets were merely a reprint, and that the date of all names, etc., contained in them is that of the part of this magazine in which they appeared. I have given above all the available information with

regard to the date of these sheets, in order to enable any who may be interested to work out this fact for themselves, merely adding that the publishers inform me that this Magazine has always been obtainable by the public on the first day of the month of issue. The actual dates for all purposes of priority are therefore as follows:—

Proceedings for—	
Jan. 6th—April 6th, 1840	**Jan. 1st, 1841.**
May 4th—Dec. 7th, 1840	**April 1st, 1841.**
Jan. 4th, 1841	**July 1st, 1841.**
Feb. 1st, 1841	**Sep. 1st, 1841.**
Mch. 1st—April 5th, 1841	**Nov. 1st, 1841.**
May 5th—July 5th, 1841	**Dec. 1st, 1841.**
Aug. 2nd—Oct. 4th, 1841	**Feb. 1st, 1842.**
Nov. 1st 1841 (to end of Saunders' memoir)	**July 1st, 1842.**
Nov. 1st, 1841 (from beginning of Westwood's memoir)—Feb. 7th, 1842 . .	**Sep. 1st, 1842.**
March 7th—April 4th, 1842 . . .	**Jan. 1st, 1843.**
May 2nd—June 6th, 1842	**April 1st, 1843.**
July 4th—Aug. 1st, 1842	**June 1st, 1843.**
Sep. 5th—Nov. 7th, 1842*	**Nov. 1st, 1843.**
Jan. 2nd—Mch. 6th, 1843	**Dec. 1st, 1844.**
Apr. 3rd—June 4th, 1843	**June 1st, 1845.**
July 3rd—Sep. 4th, 1843	**July 1st, 1845.**
Oct. 2nd—Dec. 4th, 1843	**Sep. 1st, 1845.**
Jan. 1st—Mch. 4th, 1844	**Oct. 1st, 1845.**
April 1st—Aug. 5th, 1844	**Jan. 1st, 1846.**
Oct. 7th—Dec. 2nd, 1844	**April 1st, 1846.**
Jan. 6th—April 7th, 1845	**July 1st, 1846.**
May 5th—July 7th, 1845	**Nov. 1st, 1846.**
Aug. 4th—Sep. 1st, 1845, to end of Saunders' memoir	**Dec. 1st, 1846.**
Sep. 1st, from Further Notes on the Honey-bee—Dec. 1st, 1845	**Jan. 1st, 1847.**
Jan. 5th—June 1st, 1846	**Feb. 1st, 1847.**
Aug. 3rd—Dec. 7th, 1846	**Mch. 1st, 1847.**

* The Proceedings for Dec. 1842 were omitted from the Magazine; fortunately they contain no descriptions. The long interval between this and the next instalment explains the instruction given on Aug. 5th, 1844, to the Treasurer and Secretary (*v. supra*).

APPENDIX *C.*

NOTES ON THE DATES OF PUBLICATION SINCE 1896.

Since the beginning of the year 1896 each part has borne the month and day of publication, and with very few exceptions these may be taken as correct, Messrs. Longmans & Co. having generally received them on the same or the following day. There are a few occasions on which they have been sent out to the Fellows on the day previous to that on which they were dated, but even in these cases it is only those resident in the London district who have received them before the nominal date of publication, and such may well be regarded as cases of "preferential distribution." The very few cases of more important discrepancy are as follows:—

Vol.	Part.	Dated.	Received by Messrs. Longmans.
1900	3	Oct. 22nd	Oct. 12th
1903	2	June 2nd	May 30th
1907	5	April 14th	April 22nd

The last of these is quite unimportant.

APPENDIX *D.*

ON PART 1 OF THE VOLUME FOR 1894.

In the Proceedings in the volume for 1894, p. xxii, it is recorded that Sir George (then Mr.) Hampson raised a question as to the date of Part 1 of the Transactions for that year, certain names depending on the date for their priority. The date on p. 1 is "March," that on the cover "April" (unfortunately not a unique discrepancy), and the part was actually issued in May. A few copies were sent out to Members of the Council on April 9th, and the issue was immediately stopped because a figure on Plate 1, which had been cancelled, had never been replaced, and a blank appeared on the plate where the figure should have been. No copies had been sent to Messrs. Longmans, none had been sold, none were distributed outside the Council, and those issued were recalled, and it was held

that no publication had taken place. A discussion took place at the Meeting of June 6th on the question raised by Sir George Hampson, and he proposed, "having regard to the Secretary's statement," that May 2nd should be held to be the date. There is no record of what the Secretary did say, and the Council Minute Book of that period is unfortunately the one missing volume (*v.* App. *F*), but the Postage Book shows that he might very well have said that the revised Part was delivered to the Society and issued by them on May 2nd, and on this information Sir George Hampson's proposal was undoubtedly right. Amendments were proposed, and Mr. Verrall's, referring the matter to a Committee, was adopted. Now the only thing open to such a Committee to do was to find out whether the Part in question had been published at an *earlier* date than May 2nd, as the evidence of its publication by that date was complete, but at the meeting on Dec. 5th they reported that the first day it was available at the Publishers was May 11th, which was consequently "fixed" as the date of publication. With the information now available it is impossible to account for this date at all, the day on which Messrs. Longmans received their copies of the Part being May 15th. There can, however, be no doubt that, the decree of the Council notwithstanding, the real date of the publication of Part 1 for 1894 is May 2nd of that year.

APPENDIX *E.*

ON THE INFORMATION AVAILABLE FROM THE PRINTING FIRMS EMPLOYED BY THE SOCIETY.

The first volume of the First Series of Transactions (together with the Proceedings), consisting of three Parts, was published by Richard Taylor, Red Lion Court, a firm now represented by Messrs. Taylor & Francis at the same address. The sheets of Proceedings distributed at the Meetings of the Society between 1840 and 1846 were also printed (or rather reprinted, *v.* App. *B*) by the same firm, but they have been unable to find any record of these, though they have kindly furnished the exact dates of publication of the first volume. From 1837 to 1879 the printing was entrusted to various firms of Roworth, now represented by Messrs. Roworth & Co., of 19, Newton

Street, and C. F. Roworth, of 88, Fetter Lane. The former of these firms informs me that all the books which might have given information were destroyed by a fire in 1880, whilst the latter, whose books up to 1850 have also been destroyed, have kindly provided me with almost all dates of delivery to the Society between 1850 and 1867, and also with a few subsequent to that year. These, I believe, may be regarded as exact and reliable, though it is possible that in some cases copies may not actually have been obtainable till the following day.

Messrs. West, Newman & Co., who printed the Transactions from 1880–1893, have furnished me with dates for those years, which, however, are not to be relied on for fixing dates of publication, as the following extract from their letter shows: "We do not guarantee these dates at all as the exact ones of issue. We have taken them from our Ledger books—the only possible method at this distance of time. To look up deliveries would be a question of an immense time, even if we have all our delivery books to refer to, which is unlikely." A few of the dates given are manifestly incorrect, as they are later than those of the Postage Book of the Society, but since they are, as a rule, earlier than any others obtainable, I have given the entire list, though I have not ventured to use them as the dates of publication.

The printing firm employed from 1894 to 1897 I have been unable to trace.

APPENDIX *F.*

ON THE BOOKS OF MINUTES, ETC., IN THE LIBRARY OF THE SOCIETY.

In addition to the Books at present in use, the Society possesses—

(1) A book containing

(*a*) The Minutes of the Meetings of the Aurelian Society from July 1801 to Jan. 14th, 1805.

(*b*) Those of the Entomological Society of London from May 6th, 1806, to July 19th, 1822. (The Meetings after 1812 were very irregular.)

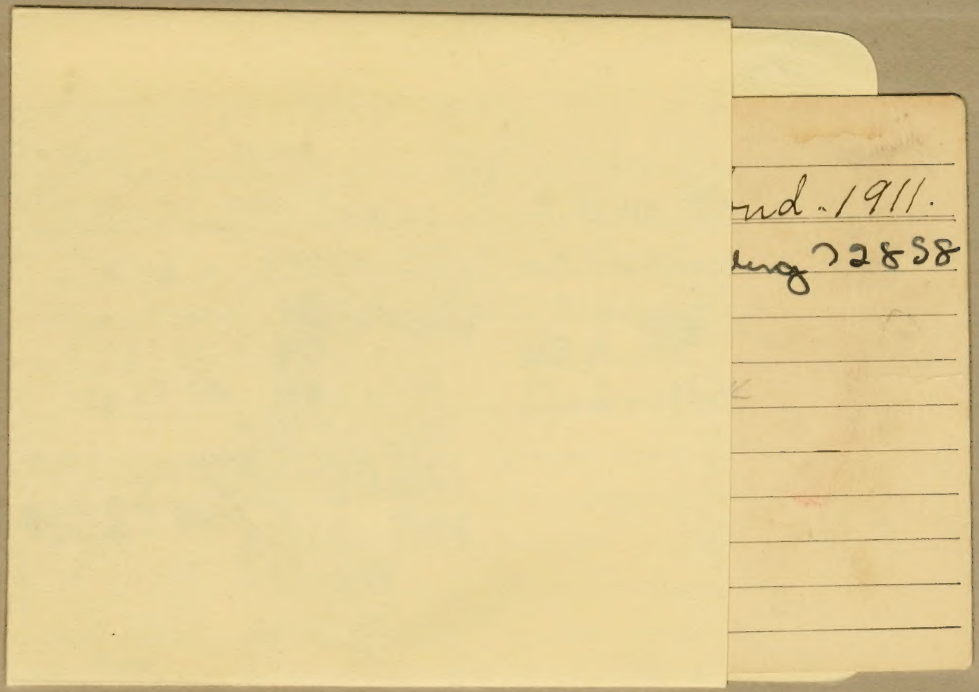
(2) The Treasurer's Account Book from 1806 to 1808.

(3) Council and General Meetings from May 3rd, 1833, to May 1st, 1837.
(4) General, Council, and Publication Committee Meetings from May 1st, 1837, to Jan. 6th, 1845.
(5) Council and General Meetings from Jan. 27th, 1845, to Jan. 24th, 1848.
(6) Council Meetings from Feb. 7th, 1848, to Dec. 3rd, 1860.
(7) General Meetings from Feb. 7th, 1848, to Dec. 6th, 1856.
(8) Meetings of Council from Jan. 22nd, 1855, to July 5th, 1869 (rough notes only).
(9) Council Meetings from Jan. 7th, 1861, to July 1st, 1872.
(10) General Meetings from Feb. 2nd, 1863, to Nov. 6th, 1871.
(11) General Meetings from Nov. 20th, 1871, to Aug. 4th, 1883.
(12) Council Meetings from Feb. 2nd, 1898, to Jan. 18th, 1911; and Business Committee Meetings from Nov. 18th, 1908, to Jan. 18th, 1911.
(13) General Meetings from Dec. 5th, 1894, to March 6th, 1907.
(14) Postage Book of the Transactions from 1879 to 1908.

It will be seen that the Minutes of the Council Meetings are wanting from July 1872 to Feb. 1898, and those of the General (Ordinary) Meetings from Jan. 1857 to Feb. 1863, and from Aug. 1883 to Dec. 1894, which is the more to be regretted since the early records are quite perfect. Since 1908 only the Exchange Copies of the Transactions have been posted from the Society's Rooms, though the postage account of these continues to be kept.

The Books at present in use are: (1) The Obligation Book, (2) Attendance Book, (3) Minutes of Ordinary Meetings, (4) Minutes of Council and Business Committee Meetings, (5) Additions to the Library.

February 10, 1912.



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